PROVIDER COMMUNICATION REGARDING CHILDHOOD VACCINES:

AN EDUCATIONAL MODULE

A Dissertation
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Amber Lee Burgad

In Partial Fulfillment of the Requirements
for the Degree of
DOCTOR OF NURSING PRACTICE

Major Department:
Nursing

April 2018

Fargo, North Dakota

North Dakota State University
Graduate School

Title

Provider Communication Regarding Childhood Vaccines: An Educational Module

By

Amber Lee Burgad

The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

DOCTOR OF NURSING PRACTICE

SUPERVISORY COMMITTEE:

Dr. Heidi Saarinen, DNP, FNP-C
Chair

Dr. Dean Gross, PhD, FNP-C

Dr. Lisa Montplaisir, PhD

Dr. Allison Peltier, DNP, FNP-C

Approved:

04/30/18
Date

Carla Gross, PhD, MSN, RN
Department Chair

ABSTRACT

Vaccine development in the last two hundred years has aided in the reduction of disease, illness, and mortality in a cost-effective manner. Vaccination starts at birth, and the majority of vaccines are received during childhood. Although improvements in childhood vaccination rates in the United States (U.S.) have been made, vaccine rates are still inadequate (Centers for Disease Control and Prevention [CDC], 2015b). The goal of Healthy People 2020 is to have vaccination rates for each vaccine at or greater than 90% (HealthyPeople.gov, 2017). The recommendation for vaccination from a healthcare provider has been shown to play a vital part in parental decisions regarding vaccines for their children. Effective communication can positively affect immunization rates (CDC, 2015b).

Based on the need for enhanced awareness regarding childhood vaccines and communication with the patients / parents, a continuing education module was created and implemented in collaboration with the American Association of Nurse Practitioners Continuing Education (AANP CE) Center. Accreditation was received by the American Association of Nurse Practitioners (AANP) and the module was made available to online viewers on the North Dakota Department of Health (NDDOH) immunization website. The module included information on factors contributing to the childhood vaccination rates, barriers, communication styles, healthcare provider interventions that affect childhood vaccinations, and effective communication styles for healthcare providers. The co-investigator found that the results enhanced confidence in provider practice when discussing childhood vaccinations with parents.

Pretest, posttest, and evaluation questions were used to evaluate the effectiveness and understanding of the educational module. Data were collected from a total of 16 participants that completed the all aspects of the educational module. The co-investigator found an increase in

knowledge as a result of the educational module. All objectives were met, as the participants scored higher on the posttest when compared to the pretest questions on all four objectives. These results showed an increase in the ability to recognize factors contributing to childhood vaccination rates; identify barriers, communication styles, and healthcare provider interventions that affect childhood vaccines; suggest effective communication styles for healthcare providers; and report enhanced confidence in provider practice when discussing childhood vaccines with parents.

ACKNOWLEDGEMENTS

This Doctor of Nursing Practice clinical dissertation was the result of a challenging journey that could not have been achieved alone. The support and guidance I received from my classmates, teachers, North Dakota State University staff, my family, and my friends has aided in the success of this project.

I would like to start with thanking my Committee Chair Person, Heidi Saarinen for all the patience and guidance she provided to me during this project. I would also like to send gratitude and thanks to the following: the NDSU Graduate Centers for Writers for guiding me and letting me know that one should never write a paper alone; my committee members Dr. Dean Gross, Dr. Lisa Montplaisir, and Dr. Allison Peltier for their feedback; the American Association of Nurse Practitioners Continuing Education for accrediting my educational module; and the North Dakota Department of Health for hosting my educational module.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE. INTRODUCTION

Background

The immunization age began in 1796 with Dr. Edward Jenner, who performed the world's first vaccination (Stern & Markel, 2005). Dr. Jenner used material from a cowpox sore to create immunity against the smallpox disease. He had noticed that some dairymaids seemed protected from smallpox after they had already been infected from the much less dangerous cowpox virus, and conducted an experiment. This eventually led to a smallpox eradication from the world in 1977 (HealthyChildren.org, 2015a). Vaccination has made a great contribution to global health with the eradication of smallpox. Eradication of smallpox led to enhancement of vaccines (Greenwood, 2014).

The next major immunization advancement occurred in 1885 by Dr. Louis Pasteur. Prior to this, vaccines referred only to cowpox inoculation for smallpox (Stern & Markel, 2005). Dr. Pasteur used a vaccine to prevent rabies by showing that disease can be prevented with weakened germs. By the mid-20th century, continued immunization progress was made. Dr. Jonas Salk developed the inactivated polio vaccine and Dr. Albert Sabin developed the live polio vaccine. Polio was eliminated in the United States (U.S.) and the rest of the Western Hemisphere in 1991 (HealthyChildren.org, 2015a). Prior to the availability of the polio vaccine, in the U.S., there were reported 13,000-20,000 cases yearly. In the 1940s and 1950s, polio paralyzed and even killed thousands of children (Fitzpatrick, 2006). Many other serious diseases such as measles, mumps, rubella, tetanus, and diphtheria have either been eliminated or have been dramatically reduced in numbers. In the 1920s, diphtheria claimed more than 10,000 lives yearly. In 1998, there was one case. Measles used to affect nearly one half-million U.S. children every

year and could cause complications such as pneumonia and encephalitis (HealthyChildren.org, 2015a).

Vaccine development started a little over two hundred years ago. Development of vaccines was at a slow rate until the last several decades. New scientific discoveries and technologies have led to advances in virology, molecular biology, and vaccinology (Immunization Action Coalition, 2016). Greenwood (2014) found that the development of each vaccine, starting with smallpox, opened a window for vaccine research and development. Due to the development of the rabies vaccine, the knowledge of the ability to grow viruses in tissues lead to the development of attenuated vaccines. As a result, many vaccines have been developed using the principle of attenuation, such as rubella, influenza, rotavirus, tuberculosis, and typhoid. The attenuated organisms from these vaccines induced a strong and sustained immune response, resulting in a more effective immunity. Attenuated vaccines were also relatively cheap to make. Additional research led to several vaccines being developed using killed whole organisms. Vaccines using killed whole organisms included pneumococcus, meningococcus, and typhoid bacillus, which continue to help improve population health today (Greenwood, 2014).

With these advances in vaccine development, life expectancy in the 20th century was positively impacted. Vaccines reduce infectious diseases and mortality (HealthyPeople.gov, 2017). Vaccination with the current childhood schedule prevents about 42,000 deaths, prevents 20 million cases of disease, and saves 14 billion dollars in direct costs with 69 billion dollars in societal costs. Researchers found that individuals that do not get vaccinated cost the U.S. economy more than 47 billion dollars a year (HealthyPeople.gov, 2017). Keefe (2016) examined the actual costs of inpatient and outpatient care as well as medications and the value of productivity lost form time spent seeking care. Immunizations cause decreases in disease cases,

hospitalizations, deaths, and health-care costs associated with vaccine-preventable diseases (HealthyPeople.gov, 2017).

Healthy People 2020 (2017) provides science-based national objectives with a focus on the improvement of the overall health of Americans. One of the goals of Healthy People 2020 is to increase immunization rates and reduce preventable infectious diseases. There are currently 17 target vaccine-preventable diseases identified from childhood to adulthood (HealthyPeople.gov, 2017). Vaccine schedules are designed and implemented to protect children early in life as this is the time that they are most vulnerable to diseases (Centers for Disease Control and Prevention [CDC], 2017c). According to the CDC, the current vaccination recommendation schedule for 2017 includes the following (Table 1) (Centers for Disease Control and Prevention [CDC], 2017c).

Table 1

Recommended Immunization Schedule for Vaccine-Preventable Diseases

Disease	**Immunization**
Diptheria, Tetanus, and Pertussis (DTaP)	5 doses by 6 years
Haemophilus Influenza B (Hib)	4 doses by 15 months
Hepatitis A and B	A = 1 dose by 23 months B = 3 doses by 18 months
Human Papilloma Virus	2 or 3 doses starting at age 11
Meningitis	1 dose at age 11, booster at age 16
Measles, Mumps, and Rubella (MMR)	2 doses by 6 years
Poliomyelitis	4 doses by 6 years
Pneumonia	4 doses by 15 months
Rotavirus	3 doses by 6 months
Shingles	1 dose after age 50
Varicella	2 doses by 6 years

However, people in the U.S. continue to develop diseases that are preventable by vaccines. Vaccine-preventable diseases such as viral hepatitis and influenza account for some of

the leading causes of illness and death in the U.S. Healthy People 2020 is focusing on improvements in technology and utilizing state, local, and governmental organizations to become partners in reducing the spread of disease. Awareness of common preventable diseases and preventative health are identified as key components for the reduction of the spread of infectious diseases (HealthyPeople.gov, 2017).

Vaccines are identified as one of the most cost effective preventative services that can start at birth. A vaccine is the actual product that produces immunity from a disease. Vaccines lead to immunization, which is the process by which one becomes protected from the disease (HealthyPeople.gov, 2017). It is estimated that vaccination in the U.S. prevented approximately 20 million cases of disease and 40,000 deaths (Orenstein & Ahmed, 2017). Previous estimates are that childhood vaccination helped save 33,000 lives, prevented 14 million cases of disease, and can reduced healthcare costs by $9.9 billion. Respiratory illnesses are the eighth leading cause of death annually and account for 56,000 deaths each year. Influenza alone leads to 200,000 hospitalizations and 36,000 deaths annually. These respiratory illnesses include both influenza and pneumonia, which can both be inhibited by vaccines (HealthyPeople.gov, 2017).

There has been a marked improvement in childhood vaccination rates. The goal of Healthy People 2020 is to have all vaccination rates for each vaccine at or greater than 90% (HealthyPeople.gov, 2017). Vaccination rates can still be improved. In 2011, 84.6% of children age 19-35 months had received four doses of DTaP, so efforts to increase vaccination can be made in this area (Centers for Disease Control and Prevention [CDC], 2015b). Although there has been progress, 300 children in the United States continue to die each year from a disease that is vaccine-preventable, as there is a risk for new strains of diseases developing (HealthyPeople.gov, 2017).

The incidence, prevalence, morbidity, and mortality of vaccine-preventable diseases have decreased significantly in the U.S., due to efforts to vaccinate infants and children. Most diseases are spread from person to person. Someone who develops an immunity to the disease cannot get the disease and cannot spread the disease to anyone else (Centers for Disease Control and Prevention [CDC], 2017d). The immune individual can stop the transmission of disease and cause community protection by reducing the spread of disease within a population (Orenstein & Ahmed, 2017). Someone who is not immune, can get the disease and is then a vector to spread it to other individuals. The more people who are vaccinated against a disease, the less the opportunity for disease to spread to others in that same group. This is known as herd immunity. Disease outbreaks can happen in communities where vaccination rates are less than 90% (CDC, 2017d).

In 2014, there were 644 cases of measles in the U.S. (Ventola, 2016). According to the Centers for Disease Control and Prevention (CDC), that was a record number of measles cases for the U.S. The majority of people who got measles were unvaccinated, and measles can be spread when the disease reaches a community in the U.S. where groups of people are unvaccinated (CDC, 2017d). A CDC report from January 4 to April 2, 2015 showed that there were 159 measles cases in the U.S.; sixty-eight of these cases were unvaccinated individuals, and of these, 43% stated philosophical or religious beliefs to vaccination (Orenstein & Ahmed, 2017).

Early vaccination in infants and children is vitally important. Newborns are born with some immunity from disease from their mother, but the protection can start to go away within the first year of life. A child's immune system is weaker than adults and may not be strong enough to fight off some diseases. It also can take longer to produce antibodies or develop

immunity from disease after disease exposure or vaccination (Centers for Disease Control and Prevention [CDC], 2017e).

Significance

The recommendation of a healthcare provider plays a powerful role and motivational factor for parents regarding compliance of current childhood vaccine recommendations (CDC, 2015b). Studies show a strong association between healthcare provider recommendations and the likelihood of vaccine acceptance among a variety of patient groups (Villacorta & Sood, 2015). The positive opinion and recommendation by a healthcare provider has shown positive effects on the parent and/or patient response and agreement to immunize (CDC, 2015b). Awareness and knowledge have been found to increase a healthcare provider's willingness to recommend vaccines. Nurses with higher medical experience are more likely to recommend vaccines to their patients as well (Paterson et al., 2016). Ventola (2016) indicated that absent or weak recommendations from healthcare providers are a cause of poor vaccine acceptance. Vaccines are discussed with the patients and parents by either the nurse or provider. There continue to be missed opportunities for childhood vaccinations due to a variety of barriers. One such barrier is that vaccines may only be addressed during a well-child exam or sports physical (CDC, 2015b). In the U.S., 64.5% of under vaccinated children under the age of 2 was attributed to missed opportunities. The reason for missed opportunities can often be due to the time allotted to various visits, or that a child presents for a sick visit when shots are due, with the added possibility that the sick visit will take the place of the well-child visit (Robison, 2013). Elimination of missed opportunities by addressing vaccines at every visit can increase childhood vaccination coverage by 20% of the under vaccinated population (CDC, 2015b).

Strategies recommended by the CDC (2015b) to help prevent missed opportunities include change in approach to both the providers and the patients / parents. For the providers, policies include the use of standing orders, healthcare provider education, and provider reminder and recall systems may diminish missed opportunities. For the patients / parents in regard to pediatric vaccines, tactics including provider recommendation, reinforcing future vaccine needs, and implementing patient reminder calls can decrease missed opportunities.

Ventola (2016) found that some parents decline or even delay vaccination due to personal, medical, or religious beliefs. Exemptions result in 1 to 3% of children in the U.S. being excused from vaccination. Healthcare providers can make an impact on whether their patients are vaccinated or not (Ventola, 2016). Positively influencing vaccination rates starts with effective communication and counseling the parents and children about the vaccines and about the diseases they prevent. The parents may not be aware that their children need vaccines or what vaccines they need, often thinking they are up to date on vaccines or not believe they are important (Ventola, 2016).

Vaccination rates can continue to be improved. The goal of Healthy People 2020 is to have all vaccination rates for each vaccine at or greater than 90%. Vaccine rates remain below this mark in the United States and should be improved across ethnic groups as well as all family income levels (HealthyPeople.gov, 2017).

Even though Measles, Mumps, Rubella (MMR) total immunization rates in the U.S. were reported at 91.9%, there is still a lack of the MMR vaccine in certain ethnic groups, therefore efforts can be made to increase vaccination rates in these populations. For example, American Indian and Alaska Native ethnicity have 84.1% vaccination rates. Pneumococcal (PCV) total

rates in the U.S. were reported at 84.1%. There is a need for improvement in the PCV vaccine in all ethnic groups across America (HealthyPeople.gov, 2017).

Primary care providers can experience challenges with communication with their patients**.** Everyone on the healthcare team is responsible to educate patients on vaccines. This includes all healthcare providers: nurse practitioners, schools, dentists, chiropractors, primary care providers, specialty providers, nurses, physicians, and physician assistants. A recommendation at every visit and a positive attitude toward vaccines can positively affect vaccination rates (Leask et al., 2012). Provider communication styles have shown to be effective in increasing vaccine rates by saying that the child is due for vaccines, when compared to giving information or eliciting questions. Provider consistence and addressing vaccines at every visit also plays a positive role (Gilkey, Malo, Shah, Hall, & Brewer, 2015). Provider recommendations about vaccines involve education on the vaccines and diseases as well as addressing any questions or concerns. Effective communication strategies regarding vaccines can positively impact childhood vaccination rates as well as the parents' perceptions (Leask et al., 2012).

The practice improvement project aided efforts to enhance education regarding vaccines by developing and implementing an educational module accredited by the American Academy of Nurse Practitioners (AANP) and implemented on the North Dakota Department of Health (NDDOH) immunization website to further assist providers on how to effectively communicate and motivate parents in regards to vaccine information education to impact childhood immunization rates across the U.S. The educational module focused on the benefits of childhood vaccinations, how to communicate with parents, barriers that exist, and different communication approaches. The project provided insight on how there was still a need to increase rates, as some

providers may feel as though they are doing fine, when they may not be doing fine as indicated by national averages and statistics.

Objectives and Project Description

The purpose of the practice improvement project was to provide education on effective communication styles when talking with parents about childhood vaccines to increase immunization rates and to better identify barriers to improve vaccine rates in the future. Specifically, to identify barriers that exist, current communication and practices, and education on vaccines. The purpose of this project was met by the achievement of the following objectives:

1. Recognize factors contributing to current childhood vaccination rates.
2. Identify barriers, communication styles, and healthcare provider interventions that affect childhood vaccines.
3. Suggest effective communication styles for healthcare providers.
4. Evaluate enhanced confidence in provider practice when discussing childhood vaccines with parents after viewing the educational module while drawing from their previous practice experience.

An hour-long continuing educational module was implemented by the co-investigator in collaboration with the American Association of Nurse Practitioners Continuing Education (AANP CE) Center and the NDDOH. Accreditation was received by the AANP and it was made available to online viewers on the NDDOH immunization website. The target population included providers, students, and nursing staff that have access to the NDDOH website, are interested in increasing their knowledge of communication regarding childhood vaccines, and desired continuing education hours. The module was created to educate healthcare providers about existing barriers to vaccines, current recommendations, and strategies to improve the

vaccine rates that could potentially impact the overall health of the patient and the community where they practice.

By increasing knowledge regarding communication and childhood vaccines, healthcare providers are better able to provide education and counsel parents and patients regarding vaccines. By gaining enhanced awareness of communication regarding childhood vaccines, this project had the potential to improve vaccination rates and overall health outcomes.

CHAPTER TWO. LITERATURE REVIEW

A review of literature was performed in order to identify existing research on factors contributing to current vaccine rates, barriers affecting childhood vaccination rates, effective communication styles, ineffective communication styles, and healthcare provider interventions to aid in increased vaccination. To aid in this literature review, electronic literature sources were used through the North Dakota State University Online Library with databases such as Medline, CINAHL, Academic Search Premier, and Google Scholar. Key terms included communication, communication barriers, communication styles, healthcare provider, education, immunization, vaccination, vaccine, strategies, barriers, childhood, and pediatric. Inclusion criteria used in selecting articles included United States, North Dakota, childhood, and pediatric. Exclusion criteria included any reference prior to 2005, though articles from 2012 and more recent were preferred, and articles without full text.

Leask et al. (2012) found that communication between the healthcare provider and parents directly affect whether vaccines are given to children. Communication styles can contribute to rejection or denial of offered vaccines. Effective communication between the provider and the parent can help motivate a vaccine hesitant parent towards vaccination acceptance and can offer support to the parents who support vaccines. Healthcare providers play a major role in maintaining public trust regarding vaccines and affect individual parental decisions regarding their children (Leask et al., 2012). Healthcare providers remain the most trusted advisor and influencer of vaccine decisions (Paterson et al., 2016).

Childhood Vaccines

In the U.S., the majority of vaccines are given to children less than 5 years of age. Brunson (2013) found that parents are the decision makers regarding childhood vaccines. Yet,

when making vaccine decisions, parents are often not completely making these decisions on their own. Other key players include healthcare providers, family, and social media (Brunson, 2013). The internet and social media sites such as Twitter and Facebook have made it easier to disseminate vaccine related concerns and misconceptions. In 2009, 10% of parents listed the internet as one of the top thee trusted sources for information on childhood vaccines. In 2010, this number increased to 24% (Kennedy, LaVail, Nowak, Basket, & Landry, 2011). In the U.S., parents often have access to the internet, magazines, and television for additional information and advice. Parents are using their social networks to aid in decision making. According to Brunson (2013), there was a strong relationship between social networks, the people and the sources around them, and a parent's decision to vaccinate or not vaccinate their child.

Vaccine coverage in the U.S. remains fairly high, but has room for improvement. According to Ventola (2016), in 2014, the completion rates of the immunization series for DTaP, IPV, Hep B, PCV, and Hep A are as follows.

Table 2

Completion Rate of Immunization Series

Vaccine	**Completion rate (%)**
DTaP	94.7
IPV	93.3
Hep B	91.6
PCV	92.6
Hep A	57.5

Less than 3% of children did not receive any vaccines at all in 2014 (Ventola, 2016). With some of the population not getting vaccinated, this can lead to outbreaks of certain diseases. Causes of this include refusing to vaccinate, incomplete vaccination series, and waning immunity. Vaccine hesitancy and resistance has shown outbreaks of Hib, varicella,

pneumococcus, measles, and pertussis in the U.S. In 2000, measles was no longer endemic, or found in the population in the U.S. In 2014, there were 644 cases of measles in the U.S. (Ventola, 2016). Vaccine resistance includes parents that refuse vaccines. Vaccine refusers consists of 1-2% of parents in the U.S. Vaccine hesitancy includes parents that are hesitant about or elect to delay vaccines. Vaccine hesitancy consists of 11-19% of parents nationwide (Anderson, 2015). Vaccine resistance and hesitancy can lead to outbreaks of disease and an overall decline in the health of the population. Healthcare provider education has the potential to positively influence these rates.

Kindergarten immunization rates in North Dakota (ND) have overall trended upward from the 2008-2009 school year to the 2017-2018 school year. In 2012, polio, DTaP, MMR, and Varicella were all at or below 90%; in 2017 these were all above 93%. According to the ND Department of Health, the kindergarten immunization rate trends are as displayed in the graph below (North Dakota Department of Health, n.d.).

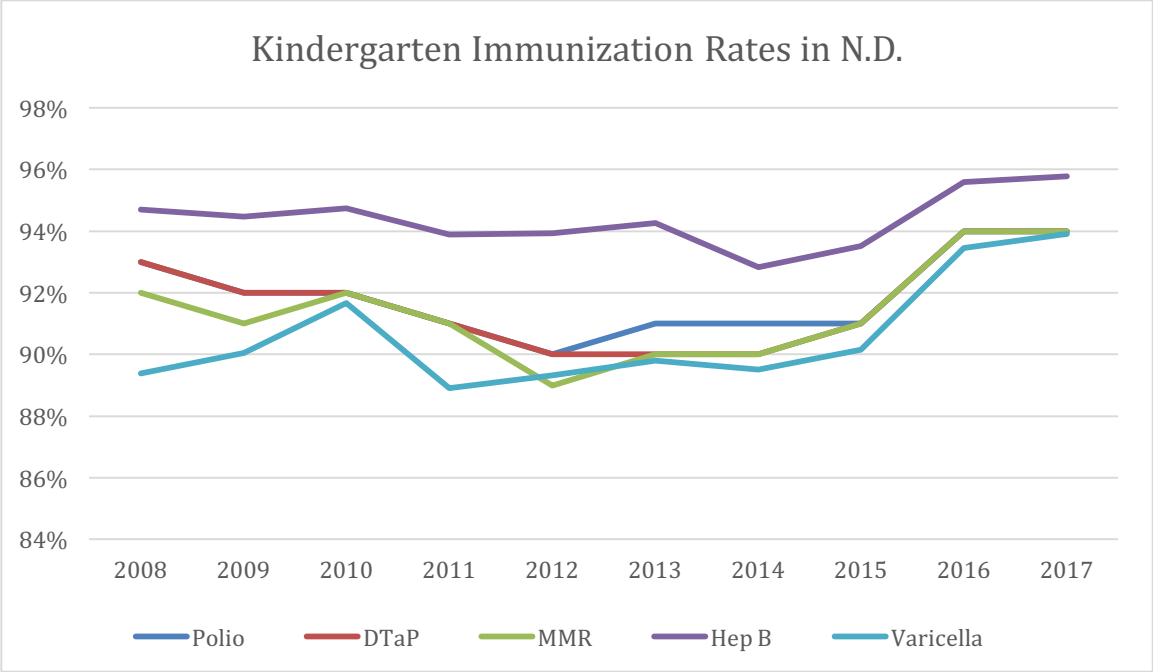

Figure 1. Kindergarten Immunization Rates in North Dakota

Rates in ND have shown consistent growth and improvement. In the 2012-2013 school year, MMR DTaP, and varicella rates were below 90%. In the 2015-2016 school year all vaccines, including polio, DTaP, MMR, hepatitis B, and varicella showed great growth; all rising above 93% (North Dakota Department of Health, n.d.). There is still room for growth in vaccination rates in ND. The ND Department of Health's kindergarten vaccine rate goal is set at 95%. They have been working with ND State University's Center for Immunization Research and Education to help increase overall rates (Emerson, 2018). The communication and guidance from the healthcare provider can also help to increase these rates.

Vaccine Barriers

In the U.S., there is an increasing number of parents having concerns about vaccinations for their children. Seventy seven percent of parents were found to have concerns about vaccines (Kennedy et al., 2011). These concerns include receiving too many vaccines, the ingredients in the vaccines, side effects of vaccines, and the importance of vaccines (American Academy of

Pediatrics, 2017). There has been a rise in the rate of vaccine exemptions for kindergartners and an increase in the use of alternative vaccination schedules. The number of children with incomplete primary vaccine series by kindergarten is below the Healthy People 2020 goals overall (HealthyPeople.gov, 2017).

Vaccination exemption rates in the U.S. for children enrolled in kindergarten during the 2013-14 school year had a median of 1.8% (Seither et al., 2014). There is room for improvement in decreasing vaccine exemptions, as the goal would be no vaccine exemptions. Exemptions can lead to outbreaks of disease in communities. In a number of states in the U.S., (Table 2), vaccine exemption rates continued to rise over the last five years (Samuel, 2017). These states include Connecticut, Florida, Iowa, Kentucky, Maryland, New York, North Carolina, North Dakota, Ohio, Oklahoma, and Virginia. From 2009 to 2016, the number of kindergartners that had nonmedical exemptions in these states grew. The following table represents these changes (Samuel, 2017).

Table 3

Vaccine Non-Medical Exemption Rate Growth in Kindergartners

State	**2009**	**2016**
Connecticut	387	689
Florida	2100	4226
Iowa	359	635
Kentucky	193	382
Maryland	393	601
New York	1117	1729
North Carolina	756	1240
North Dakota	67	299
Ohio	1515	2896
Oklahoma	456	816
Virginia	751	901

In 2016, the North Dakota kindergarten exemption rates were at 4.5% (North Dakota Department of Health [NDDOH], 2017). This consisted of 1% having no record of exemption, 2.5% stating personal belief exemption, 0.7% stating religious exemption, and 0.3% stating medical exemption (NDDOH, 2017). These rates continue to grow each year. In the 2009-2010 school year, the overall kindergarten exemption rate was at 1.5%. The 2012-2013 exemption rate increased to 1.7%. The 2015-2016 exemption rate increased to 3.0% (NDDOH, 2017). Increased exemption rates can lead to an increased incidence of vaccine preventable diseases in the U.S. Vaccine safety has been reported as vaccine-hesitant parents' biggest concern (Williams, 2014).

Ventola (2016) found that vaccine barriers can have a negative effect on overall vaccination rates and directly impact morbidity and mortality. Due to the result of vaccine availability, vaccine preventable diseases have seen a decline in mortality and morbidity (Ventola, 2016). As of 2016, diphtheria and polio have seen a 100% reduction; measles, and rubella have seen a 99.9% reduction; mumps has seen a 95.9% reduction; tetanus has seen a 92.9% reduction; and pertussis has shown a 92.2% reduction in mortality and morbidity in the U.S. (Ventola, 2016). The following paragraphs delineate specific barriers as directed by the current literature.

Safety and Necessity

Leask et al. (2012) found that parental concern regarding safety and necessity of vaccines is a major factor and barrier affecting childhood vaccination rates. Vaccine preventable diseases are becoming less common due to more children being vaccinated and more vaccines being available. Unfortunately, this can negatively affect vaccination and disease rates as parents are now expressing more concerns about safety and necessity of vaccines. A major reason for this is

that parents are not seeing these diseases and wondering about the need to continue to vaccinate against them.

Side Effects

Parents are showing concern with both immediate and long term side effects of vaccines. In a survey of 13,000 parents of children 8 to 35 months of age, the most common cited barrier to vaccination was the concern about side effects (Ventola, 2016). Some parents have been found to focus too much on possible immediate side effects of vaccines such as rash, swelling, or pain. Possible side effect concerns are then used to rationalize parents' reason to avoid vaccinating their child. Parental side effect misconceptions can lead to delays in immunizations, under immunized children, and further questions for the healthcare provider during office visits (Leask et al., 2012).

Any vaccine can cause side effects after administration. Most of these are mild and will subside after a few days. Possible side effects from vaccines are studied by the Advisory Committee on Immunization Practices (ACIP) for each vaccine. Vaccines pose a risk to receive the vaccine and a risk not to receive the vaccine and develop the illness. With most side effects of vaccines being mild and only lasting a few days, risks would outweigh developing the illness or disease (Centers for Disease Control and Prevention [CDC], 2017b). The following paragraphs describe the current statistics on childhood vaccines regarding side effects in regards to particular vaccines.

The risk of a DTaP vaccine causing serious harm or death is rare. Mild side effects are common and happen in 1 out of 4 children and include fever, redness or swelling at the injection site, and soreness or tenderness at the site. Moderate side effects are uncommon, and include a

seizure in 1 out of 14,000 children, non-stop crying in 1 out of 1,000 children, and high fever over 105 degrees Fahrenheit in 1 out of 16,000 children (CDC, 2017b).

The risk of a Hepatitis A vaccine causing serious reactions are rare. Hepatitis A vaccine is usually tolerated well. Mild side effects include soreness or redness at the injection site, low grade fever, headache, and fatigue. Possible side effects usually last only 1 to 2 days (CDC, 2017b).

The risk of a Hepatitis B vaccine causing serious reactions are rare. Hepatitis B vaccine is usually tolerated well. Mild side effects include soreness at the injection site and a temperature of 99.9 degrees Fahrenheit or higher (CDC, 2017b).

The risk of a Hib vaccine causing serious reactions are rare and is usually tolerated well. Mild side effects include redness, warmth, or swelling at the injection site and fever. Possible side effects may last 2 to 3 days (CDC, 2017b).

The risk of an Influenza vaccine causing serious reactions is rare. The Influenza vaccine is usually tolerated well. Mild side effects include soreness, redness, or swelling at the injection site, fever, aches, headache, itching, and fatigue. Potential side effects last one or two days. More serious reactions include a small increased risk of Guillain-Barre Syndrome. The risk for Guillain-Barre Syndrome is 1 or 2 additional cases per 1 million people that are vaccinated, which is much lower than the risk of complications from the disease. Children who get the flu shot along with pneumococcal and/or DTaP have shown a slight increase risk to developing a seizure caused by fever (CDC, 2017b).

The risk of a MMR vaccine causing serious reactions is very small. The MMR vaccine is usually tolerated well. Mild side effects include fever in 1 out of every 6 people, mild rash in 1 out of every 20 people, and swelling of the cheek and neck glands in 1 out of every 75 people.

These symptoms are usually seen within 6 to 14 days after vaccination. Moderate side effects include seizures caused by fever in 1 out of 3,000 doses, temporary pain and joint stiffness in teens and adult women in 1 out of every 4 doses, and a temporary low platelet count in 1 out of 30,000 doses (CDC, 2017b).

The risk of a PCV13 vaccine causing serious reactions is rare. The PCV13 vaccine is usually tolerated well. Mild side effects include drowsiness, temporary loss of appetite, or redness or tenderness at the injection site in 50% of the doses; swelling at the injection site and mild fever in 1 out of 3 doses; and fussiness in 8 out of 10 doses (CDC, 2017b).

The risk of a polio vaccine causing serious reactions is rare and is usually tolerated well. Mild side effects include soreness at the injection site (CDC, 2017b).

The risk of a rotavirus vaccine causing serious reactions is rare. The rotavirus vaccine is usually tolerated well. Mild side effects include irritability and mild and temporary diarrhea or vomiting. More serious reactions include a risk for intussusception, which is a type of bowel blockage that is treatable and can occur naturally as well. The additional risk is about 1 in 20,000 to 1 in 100,000 (CDC, 2017b).

The risk of a varicella vaccine causing serious reactions is very small and is usually tolerated well. Mild side effects include soreness or swelling at the injection site in 1 out of 5 children, fever in 1 out of 10, and a mild rash for up to one month in 1 out of 25 people. Moderate side effects include a seizure caused by fever which is very rare (CDC, 2017b).

Parents are also becoming vaccine hesitant in regards to longer term side effects with the perceived concern that the MMR vaccine and the ingredient thimerosal are associated with autism and the influenza vaccine is associated with Guillian-Barre syndrome (GBS). The fear of thimerosal can lead to a bias of one overemphasizing the risks of vaccination and minimizing the

risks of not vaccinating (Callender, 2016). Many studies have been done regarding a possible link between autism and MMR. With this extensive research, there has been no link found between the two (Centers for Disease Control and Prevention [CDC], 2012). Parents may encounter misleading information regarding this from reliable, well-designed studies and resources (CDC, 2012). A major study done in 1998, the Lancet study, raised concerns that there was a link between autism and MMR. Since then, Lancet and most of the co-authors have retracted that statement and stated that the research was flawed. In 2010, Lancet retracted the study, citing ethical misconduct. Since that time, multiple studies have been conducted comparing thousands of children who have received the vaccine with thousands of children who have not received the vaccine (Ventola, 2016). There has been no link found between the vaccine and autism or thimerosal and autism. There has never been thimerosal in the MMR vaccine. Thimerosal was present in other vaccines and has since been removed from all vaccines since 2001. Studies show that autism rates continue to rise even with this ingredient removed from all vaccines (American Academy of Pediatrics, 2017).

Guillian-Barre syndrome (GBS) is a rare disorder in which one's immune system damages their nerve cells. This can cause muscle weakness and sometimes paralysis. Most people recover on their own. In the U.S. 3,000 to 6,000 people develop GBS each year whether they received a vaccine or not (Centers for Disease Control and Prevention [CDC], 2015a). Anyone can develop this disease, and it is more common in adults over 50. The link between GBS and the influenza vaccine sparked the public's interest in 1976 with the swine flu vaccine. There was an increase that year of 1 additional case of GBS per 100,000 people and the link remains unclear. It is more likely that one may develop GBS after having influenza than

compared to getting the influenza vaccine. The risk of developing GBS after receiving the influenza vaccine is one in one million (CDC, 2015a).

Number of Vaccines

Another great parental concern is the number of vaccines required during childhood. There are more recommended vaccines today than there were 20 years ago. From 1990 to 2000, four diseases involving 10 to 12 injections were added to the ACIP recommendations. Currently 10 vaccines are in the recommendations between birth and age 10 (Ventola, 2016). Some parents question this and have shown concern that giving too many vaccines at one time can cause harm to their child or may overwhelm the child's immune system (American Academy of Pediatrics, 2017). According Offit et al. (2002), a national survey showed that 23% of parents question the number of shots recommended for their child and 25% of parents are concerned that the vaccines will weaken their child's immune system. Concerns arising from multiple vaccines given at one time can result from younger parents not seeing the diseases that vaccines prevent. They go on to state the antigen receptors indicate that the immune system has the capacity to respond to a large number of antigens and documented that if a child received 11 vaccines at one time, about 0.1% of the immune system would be used by estimation. They conclude vaccines may cause a short-lived immunosuppression, which has not been found with all vaccines and does not result in an increased risk for infections (Offit et al., 2002).

The childhood vaccine schedule is developed based on evidence and provided to expose the child against these diseases at the earliest possible time to prevent diseases (CDC, 2012). With parental hesitancy to provide too many vaccines at once, vaccine compliance declines. A study of 13,000 parents of children age 8 to 35 months, two-thirds of the parents preferred their child only have two injections at a visit stating a concern for safety of too many vaccines.

Concerns and perception of risk associated with vaccination has been fed by media attention (Ventola, 2016). Twenty-six percent of parents of children through the age of four report they follow news reports about childhood vaccines very closely (Funk, Kennedy, & Hefferon, 2017).

Moral or Religious Beliefs

Some vaccine hesitant parents prefer that their children acquire disease naturally. A common belief is that the human body protects itself from serious complications of vaccine preventable disease (Williams, 2014). Other reports from parents include that their belief is that some vaccine preventable diseases are not dangerous, their child may not be at risk for the diseases, or that if these diseases are acquired that they can be easily treated (Williams, 2014).

Other religious and moral barriers found with vaccine hesitant parents, include concerns about prior use of fetal tissue in the manufacturing of vaccines (Williams, 2014). Two human cell strains have been used in the development of currently available vaccines. These include Hepatitis A, Rubella, Varicella, Zoster, Adenovirus, and Rabies vaccines. Two fetuses have given rise to the human cell strains used in vaccine development. This took place in the 1960s. Neither abortion was reported to have been performed for the purpose of vaccine development. Fetal cells were used only to begin the cell strains used in vaccine development. Vaccines made with these two cell strains have prevented nearly 11 million deaths and prevented 4.5 billion cases of disease (The History of Vaccines, 2017).

Vaccine exemption is allowed due to medical reasons in all states in the U.S.; due to religious reasons in all states except for CA, WV, and MS; and due to philosophical reasons in ND, MN, WI, MI, OH, PA, VT, ME, WA, OR, ID, UT, CO, AZ, OK, TX, AR, and LA (National Conference State Legislators, 2017). There were 1 to 3% of children in the U.S. excused from immunization because of these exemptions. In some communities, this rate was up to 20%.

Vaccination rates were affected by both poverty level and were influenced by the states that allow exemptions versus the states that don't allow exemptions, increasing risk for disease outbreaks (Ventola, 2016).

Lack of Information

Suboptimal communication between the healthcare provider and parent has been shown to result from the healthcare provider's belief that vaccine refusal arises from ignorance of the parent (Leask et al., 2012). This can be addressed by providing information to these parents. Parental vaccine refusal is usually based from complex reasons and factors (Leask et al., 2012). The reasons that parents refuse, delay, or hesitate to vaccinate are largely due to religious reasons, personal beliefs, safety concerns, and a desire to gather more information (McKee & Bohannon, 2016; Brunner, 2014). They often gather their information from experience, professional, and social context. Parents trust in the source of the information has been found to be more important than the actual information regarding vaccines (Leask et al., 2012).

Other causes are language barriers and insufficient knowledge in regards to vaccines. Barriers lead to reduced vaccine adherence. A study of 1,600 parents showed that many parents indicated that they need more information about how vaccines work, side effects, and new changes made to recommendations (Leask et al., 2012).

Race, Education, and Socioeconomic Backgrounds

Lack of access to healthcare is directly related to socioeconomic factors including poverty, lack of transportation, and clinic hours. Some parents are unaware that they may qualify for Medicaid or other resources for healthcare coverage (Ventola, 2016). Parents of lower income brackets and of a lower educational level report greater concern regarding the need for vaccine. This group has also been shown to be more trustworthy of and look towards social

media information regarding vaccines than they are with the medical community due to poor healthcare access (Callender, 2016). Black children have shown a lower vaccination rate for DTaP, Hib, PCV, and RV when compared with white children (Ventola, 2016).

Healthcare Provider

Healthcare providers report barriers to vaccines as well. The time needed to address questions during the clinic visit, the lack of perceived trust in the provider's recommendation, and the struggle whether to refuse treatment of vaccine hesitant parents due to the risk of disease exposure to their other patients can all contribute to barriers from the provider point of view (Williams, 2014). At a well visit, the provider is checking physical, cognitive, and other childhood milestones. Providers often feel that there is not enough time to address all concerns and questions regarding vaccination (CDC, 2012). There are some parents that have a lower perceived risk of vaccine preventable diseases with a decline in disease. This parental belief makes the need for vaccination a greater challenging for the healthcare provider to communicate a need for vaccination to the parents (Ventola, 2016).

Esposito, Principi, and Cornaglia (2014) found that the main provider barriers to vaccines include lack of knowledge, poor access to records, missed opportunities, and poor communication with parents. The number of recommended vaccines for children has increased over the last decade, requiring providers to keep up to date on the current recommendations and schedules. Many providers rely on their nursing staff to discuss current vaccine recommendations as they are the ones that administer the vaccine. Missed opportunities happen when vaccines are not addressed at every visit, including sick visits (Robison, 2013). Addressing vaccines at every visit is important, as when children get older and are generally healthy, they may not come in to the clinic regularly as they previously did. Researchers from one study found

that children who had a missed opportunity were 3.1 times more likely to be incompletely immunized (Esposito et al., 2014).

Communication Styles

A major factor in shaping parental attitudes towards or against vaccination is the interaction between the parent and the healthcare provider. Effective communication and interaction between the two can address concerns and questions, helping the parent make an informed decision. Ineffective communication can negatively affect the parent's decision to vaccinate and even display dissatisfaction with the overall healthcare provider's care (Leask et al., 2012). Healthcare providers continue to be the most important and trusted resource for vaccine information and their recommendation for vaccination is one of the most important factors to improve vaccination rates (Williams, 2014). According to the CDC, this has been shown true for even parents with the most questions and concerns. A strong personal relationship between the parent and healthcare provider aids in helping support parents in understanding vaccines (CDC, 2012).

According to Leask et al. (2012), vaccines should be addressed at each encounter the healthcare provider has with the parent and child. Goals at these encounters will vary depending on the parents' readiness and acceptance of vaccines. At each encounter, the healthcare provider should focus on building a relationship, building rapport, accepting and addressing questions or concerns, and helping facilitate consent for vaccines while providing information from reliable sources. For any hesitant vaccine parents, the healthcare provider should use a guiding style and elicit the parents' own motivations to vaccine, while avoiding any excessive persuasion techniques.

Trust

Building trust is the first step and an important factor in establishing a relationship between the provider and parents. Trust has been shown to be established by the healthcare professional when they spend time with the child and parent, listen to and address their concerns, know the scientific information behind vaccines, and by using a holistic approach by treating them as individuals (Leask et al., 2012).

Communication is both the words that are said and the body language that the provider portrays. The body language and communication play a large part on establishing and building a trusting relationship (Leask et al., 2012). The number one factor that affects determining trust in vaccine hesitant parent is a healthcare provider that listens, cares, and shows empathy, as was found in 50% of individuals. The next trust factors were equally found at 15-20% of individuals, which consisted of openness and honesty, competence and expertise, and dedication and commitment (Wolicki, n.d.). These factors can show that a discussion is either important or unimportant to them. It is important to avoid distractions during patient visits. One major distraction is using the computer while talking to the parents. A positive body language and communication method can be achieved by using open ended questions and showing empathy with responses, which shows that the healthcare provider better understands parental concerns (Leask et al., 2012).

Healthcare provider recommendation of vaccines have shown significant impact on the receipt of vaccines in children. Healthcare providers' approach to discussion also plays an important role in this. According to one study, more of a participatory discussion style used by the provider resulted in a higher level of vaccine resistance (Williams, 2014). Participatory style includes using phrases such as "what do you think about shots today?". On the other side, a

presumptive discussion style used by the provider resulted in a lower level of vaccine resistance. Presumptive style includes using phrases such as "these are the shots scheduled for your child today" (Williams, 2014).

Effective Communication

Leask et al. (2012) found that when addressing parent concerns in regards to vaccinations, parents report that using a guiding style of communication by the provider, such as focusing on how they can help the parent, is an effective technique. Other guiding style strategies include showing care with their body language, eliciting parental concerns, asking permission to discuss concerns, acknowledging, listening, and empathizing with the parent's concerns, determining if there is readiness of parental change, informing parents about the risks and benefits of immunization, and giving appropriate resources (Leask et al., 2012).

Communication should be a two-way conversation between the healthcare provider and parent. Effective communication can be achieved by taking time to listen, asking and welcoming questions, and keeping the conversation going. Listening can be achieved by giving the parents full attention during the visit, maintaining eye contact, restating concerns to show and verify understanding, and pausing to process your thoughts as well as give the parent time to ask a question. Welcoming questions can be achieved by using open ended questions and showing interest in their concerns. The provider should put themselves in the parents' shoes and acknowledge their emotions. Keeping the conversation going can be achieved by acknowledging the parents concern for vaccines and showing that these concerns important to the provider (CDC, 2012).

Motivational factors encourage, influence, and guide one to a decision. They are considered a positive and important component of successful behavioral change, such as when

used to encourage vaccination. Provider recommendation for vaccination has shown to be a motivational factor in several studies (Williams, 2014).

One approach to encouraging behavioral change is through Motivational Interviewing (MI), using a guiding style of communication. Motivational interviewing includes asking the parents what they are most worried about and to describe their understanding of disease risks, vaccine risks, and vaccine benefits. Motivational Interviewing techniques involve asking questions to clarify the parents' response to change and elicits their own motivations for change, which has demonstrated the effectiveness of health behaviors such as positive influences on immunizations (Leask et al., 2012). Motivational Interviewing is patient centered, goal directed, and a focused approach to initiate change. The basic approach to MI involves using open-ended questions to invite elaboration and thinking, affirmations to recognize strengths and help build rapport, using reflective listening to show the patient that you understand, and by using summaries to recap and to communicate interest (Stewart & Fox, 2011).

According to the American Academy of Pediatrics, researchers have found that pediatricians who use a presumptive style of communication were more likely to see acceptance regarding vaccines from the parents. A presumptive recommendation involves strategies such as informing the parents that vaccines are due today instead of asking parents what they think about getting vaccines (American Academy of Pediatrics, 2018). In one study, 83% of parents resisted the healthcare providers' recommendations for vaccines when they used a participatory rather than a presumptive style of communication (Opel et al., 2013).

Ineffective Communication

Leask et al. (2012), found that when addressing parent concerns in regards to vaccinations, parents report that using a direct style of communication by the provider, such as

telling the parent what to do, is an ineffective technique. The direct style focuses more on what the provider thinks the parents should do. The provider is felt to be interjecting personal biases and opinions instead of providing evidence-based facts. Other directive style strategies include using information and persuasion to change the parent's mind about vaccines, missing cues and not listening, using jargon, discrediting information sources, overstating the safety of vaccines, and confrontation (Leask et al., 2012).

According to the American Academy of Pediatrics (2018), researchers have found that pediatricians who use a participatory style of communication were less likely to see acceptance regarding vaccines from the parents. A participatory recommendation involves tactics such as asking parents what they think about getting vaccines today instead of informing the parents that vaccines are due today.

Parental concerns for vaccines can be discussed and even alleviated by the healthcare provider with communication. Ineffective communication techniques have been identified that include making assumptions about the parent's beliefs regarding vaccines, having a negative attitude towards vaccines, using medical terms that the parent may not understand, and not addressing vaccines at every visit. Enhanced provider and parent communication can alleviate ineffective communication and help establish a strong trusting relationship between the two (Healy, 2016).

Vaccine Information

It is vitally important to discuss risks of vaccination with parents. The healthcare provider should give information about common, minor, and rare side effects. Discussions regarding possible side effects have been found to be most beneficial when individualized for each child and parent. The information should be timely, up to date, relevant, and consistent. Parents need

to be advised how to manage any possible side effects and how and when to seek help for any concerns (Leask et al., 2012).

All vaccines can cause side effects. Most are mild and will subside on their own. Common mild vaccine side effects include tenderness, redness, or swelling at the injection site, or a mild fever. Potential side effects are usually seen soon after administration of the vaccine and subside within 1 to 3 days (HealthyChildren.org, 2015b). If side effects occur, they can be treated if the child is fussy or uncomfortable with ice, Tylenol, or Ibuprofen as directed after vaccine administration.

A serious vaccine side effect would include a severe allergic reaction; such as hives, swelling of the face and throat, difficulty breathing, very high fever, or unusual behavior. With infants, an allergic reaction may also include fever, sleepiness, and disinterest in eating. In older children, an allergic reaction may include a fast heartbeat, dizziness, and feeling weak. These reactions are seen more commonly within a few minutes to hours after an immunization (HealthyChildren.org, 2015b). If a concern for a serious reaction is noted, the parent should call 911 or present to the emergency department, or contact their physician if it is less severe.

Lack of information or perceived lack of information regarding vaccines has shown negative parental attitudes about immunizations as well as a negative attitude toward healthcare providers. Gust et al. (2005) linked anxiety and concern about vaccines with a lack of information provided by the healthcare provider. One-third of the parents surveyed stated that they did not have access to enough information. Less informed parents were found to be more likely less confident in the safety of childhood vaccines and disagreed that their child's healthcare provider was easy to talk to. Providing information about the benefits and risks of vaccines by a trusted provider could improve and maintain confidence in the immunization

process (Gust et al., 2005). A level of public and parental confidence in vaccines has been found to be a significant determinant in vaccine acceptance. When confidence is high, people support current recommendations of vaccines. The opposite is true when confidence is low (National Vaccine Advisory Committee, 2015).

Healthcare Provider Interventions

Research consistently has found that when providers do not recommend vaccines or do not strongly provide vaccine recommendations during an office visit, parents often decide not to vaccinate or just ignore the topic of vaccination all together (Ventola, 2016). Effective communication between the provider and the parent can be achieved by addressing barriers to immunization, practicing good communication skills, and using an evidence-based approach to the communication. The healthcare providers' ability to effectively communicate information is a major aspect in establishing a successful relationship with the parent and patient. In order to effectively communicate, the provider needs to develop rapport, be empathetic, provide support, build a partnership, explain and evaluate understanding, practice cultural competence, and establish trust. Effective communication has been shown to allow the healthcare provider to understand the parent or patient's point of view and use this to develop a treatment plan regarding their health (The American College of Obstetricians and Gynecologists, 2014).

Healthcare providers play a major role in recommending vaccines to parents and their child. They are advocates for respectful interactions between the provider and parent and aim to guide the parent towards quality decisions regarding vaccinations (Leask et al., 2012). Vaccine accepting parents have reported that they have a good relationship with their child's healthcare provider and believe that the healthcare provider has their child's best interest at heart (Williams, 2014).

According to Shelby (2013), tools that should be used by healthcare providers to counteract the anti-vaccine movement include statistics, research, and other evidence-based information delivered both verbally and via use of the Center for Disease Control and Prevention's (CDCs) Vaccine Information Statements. This approach and information can help provide information to parents that vaccines are safe, effective, and important to their child's health. Educating vaccine-hesitant parents is important to make sure that they are fully informed. Often information alone is not enough to change a vaccine hesitant parent's mind. Personal experiences as parent's themselves and personal recommendations from the provider have positive effects on parental decisions. Healthcare providers are often parents themselves and can provide reassurance to parents with their personal experiences. Parents want to hear that providers vaccinate their own children and about the experiences that they have had with other patients (Shelby, 2013).

Interventions

Ventola (2016) found that healthcare provider interventions that have been shown to improve vaccination compliance among children include counseling, maximizing opportunities, offering combination vaccines, improving accessibility to vaccinations, and using electronic medical records. Effective counseling can be accomplished through informing the parents and child about vaccinations, making strong recommendations, providing the parents with educational materials, and using good communication strategies. It is also important for the healthcare provider to dispel myths about side effects, educate about current research, provide time to discuss parental concerns, describe infections and diseases that vaccines prevent, describe potential health and financial consequences of noncompliance, provide a vaccination record with past and future vaccine visits, provide reminders to the parents, have vaccine-hesitant parents

sign an exemption form, and inform parents that a missed dose will not require restarting a vaccination series (Ventola, 2016).

Ventola (2016) found that maximizing opportunities includes addressing vaccines at every visit and issuing standing orders to allow the nursing staff to administer vaccinations. By addressing vaccines during patient counseling, the provider can have a positive impact on immunization rates. Combination vaccines can be offered to reduce the number of injections, reducing the need for return visits, and simplifying the vaccination schedule. All of these interventions could help in an improved patient adherence. In the U.S., more than 2/3 of children under the age of two that are under vaccinated children, have been attributed to missed opportunities in the clinic. After the age of two, most children are brought in to the office for illnesses, as parents have been found to believe that their children are done with immunizations at age two. Studies have shown that utilizing these visits for immunization opportunities have reduced the child's subsequent need for care (Ventola, 2016).

According to Ventola (2016), healthcare providers can allow same-day appointments and walk-in visits for parents to come when they are able, train their staff to be friendly and welcoming, provide office hours that are convenient, and limit the wait time of the patient. These will all improve accessibility of vaccines. Electronic medical records (EMRs) are also becoming more popular in today's medicine. By using EMRs, the healthcare provider can consolidate immunization records, set alerts for needed vaccines, and follow up electronically with the parents to come back in for vaccinations. Electronic medical records have been shown to improve efficiency and accuracy of vaccinations (Ventola, 2016).

The CDC and ACIP issue annual recommendations and guidelines for vaccinations. The guidelines provide evidence-based recommendations of scheduled vaccines that are safe and

effective for the population based on age and medical conditions (Ventola, 2016). It is the role of the healthcare provider to do self-education annually to be up to date on the most current vaccine recommendations.

According to Chung, Schamel, Fisher, and Frew (2017), healthcare providers may find personal benefit from vaccine communication education. Their recommendations have been found to influence vaccine hesitant parents to immunize their children. Healthcare providers need to be up to date on vaccinations and recommendations, as these can often change. Providers are regarded as the most trusted vaccine information source among parents (Chung et al., 2017). Chung et al. (2017) showed that parents who were initially vaccine-hesitant, cited the healthcare providers' advice for changing their decision to vaccinate. These vaccine-hesitant parents do often seek healthcare providers' recommendations. By being up to date and fully educated on vaccines, healthcare providers can make a positive influence on vaccine rates (Chung et al., 2017).

The reasons for vaccine delay and refusal will change over time. To keep up with changes over time, healthcare providers must continue to assess the reasons why some parents choose to delay or refuse vaccines. This will allow for the appropriate healthcare provider education to address these concerns (Williams, 2014).

Theoretical Framework

Knowles' Theory of Andragogy

Knowles' theory of andragogy (1984) was used to guide the development and implementation of the continuing education module to increase provider knowledge of communication styles regarding childhood vaccinations. Andragogy refers to a theory of adult learning that details some of the ways that adults learn differently than children. Andragogy is

the art and science of adult learning, referring to any form of adult learning (Merriam & Bierema, 2014). The theory of andragogy was a relevant theoretical framework used to guide the continuing educational module as online modules are geared towards adult learners. It is important that educators know the concepts of Knowles' Adult Learning theory and are then able to incorporate the principles into their own teaching style (Northern Arizona University, 2010). With the advancements in healthcare and technology, there is a need for continued education for healthcare providers; therefore, this theory plays an important role.

Malcolm Knowles was an American educator who theorized andragogy, or the art and science of adult learning. He recognized that adults and children learn differently; for learning to occur, the needs of adult learners should be met (Northern Arizona University, 2010). He developed a list of assumptions regarding the characteristics of adult learners (Merriam & Bierema, 2014).

The first characteristic assumption is that the adult learner's self-concept moves from one of being a dependent personality toward one of being an independent self-concept who directs their own learning (Merriam & Bierema, 2014). The online educational module was made available for healthcare providers to choose to complete based upon their own choosing. Different styles of teaching were used throughout the module including visual and audio, as well as evaluation of the module. This allowed the participant to provide feedback and recommendations for future learning.

The second characteristic assumption is that adult learners accumulate a growing reservoir of experience that becomes a rich resource for learning (Merriam & Bierema, 2014). The online educational module was made available to all healthcare providers. These participants

have previous healthcare experiences that they can use this new information to reflect on past experiences, meeting the need for learning by experience.

The third characteristic assumption is that the adult learner's readiness to learn becomes oriented increasingly to their changing social roles (Merriam & Bierema, 2014). The online educational module was made available to all healthcare providers, with the module being accredited through the AANP and utilized the NDDOH immunization website to host the module. Participants were able to choose their topics for continuing education based on their interests and social role in healthcare.

The fourth characteristic assumption is that the adult learner's time perspective changes from one of postponed application of knowledge to immediate of application of knowledge, and accordingly his orientation toward learning shifts from one of subject centeredness to one of problem centeredness (Merriam & Bierema, 2014). The online educational module was made available to all healthcare providers and provided information on communication with parents regarding vaccinations. The information was up to date and the newly acquired knowledge can be translated by the provider for immediate practice. The participants were also able to practice using the information provided in the educational module.

The fifth characteristic assumption is that the adult learner's motivation to learn is internal rather than external factors (Merriam & Bierema, 2014). The online educational module was developed to help participants gain enhanced knowledge regarding communication with parents regarding vaccinations. The learner sought out the module based on his/her own interests and is more motivated to learn about the content due to this. This enhanced knowledge could impact his/her practice and increased personal and patient satisfaction.

CHAPTER THREE. PROJECT DESCRIPTION

Implementation and evaluation of evidence-based practices are challenging and important steps in the development of a change in practice or behavior. Successful implementation involves establishing teams for the implementation, disseminating evidence, developing clinical tools, pilot testing, preserving energy sources, allowing ample time, and celebrating successes. Evaluation of the project can help assure that change has been made or intent is indicated and that it resulted in positive, sustained outcomes (Mazurek & Fineout-Overholt, 2015).

Project Implementation

Project Description

The practice improvement project focused on developing an educational module on effective communication regarding childhood vaccinations between the healthcare provider and the parental adult population. The online educational module was developed after literature review was completed. Implementation was in the form of an online educational module as a power point presentation with voice over, written text, and embedded video. A variety of different teaching methods were used, including case studies for the participants to pick the right answer, as well as pretests and posttests. Each power point slide was approximately 2 minutes in length, had simple design, and provided a brief overview of the topic. Less busy slides make it easier for the participant to view and learn from (Center for Innovation in Research and Training, n.d.)

The module was intended for voluntary participation by any healthcare provider in any area of practice that wished to expand their knowledge on communication regarding vaccines. The module could be stopped at any time. The educational module contained literature findings and included information on existing barriers to immunizations, current recommendations, and

offered strategies to improve the vaccine rates that could impact overall health of the patient and the community that he/she resides in. Case studies were also included to demonstrate clinical application and elicit critical thinking from participants. In addition, a 5-minute video demonstration of conversations with parents from the perspective of multiple pediatricians was included. Permission for use of this video in its full original form was granted on 12/18/17 by Peggy Beck, vice president and editor in chief at Medpage Today (Appendix F). Development of the module was guided by the principle of the adult learning theory, in an effort to meet the needs of adult learners and improve practice through evidence-based research.

An hour-long continuing educational module was created in collaboration with the American Association of Nurse Practitioners Continuing Education (AANP CE) Center. Accreditation was received from the AANP and the online module was made available to online viewers on the North Dakota Department of Health (NDDOH) Immunization website. One hour of continuing education instruction was needed to provide one contact hour of continuing medical education (CME) (Centers for Disease Control and Prevention [CDC], 2017a). The AANP website suggested that the modules be an hour in length so they can offer one CME credit. The target population included Nurse Practitioners and all healthcare providers and nurses that show interest in increasing their knowledge of communication regarding childhood vaccines. The module was open to all healthcare providers on a voluntary basis. No membership was needed with either the AANP or NDDOH to participate in this module.

Data were analyzed after they were collected during active implementation of the model over approximately six weeks. Analysis included quantitative and qualitative measures from pretest and posttest surveys before and after the education model. The overall implementation took approximately two months; consisting of the implementation of the educational module and

review of the pretest, posttest, and evaluation surveys from participants. Data collection included the demographics of the participants, results of the pretest and posttest questions, and evaluation of the educational module results. There were no financial costs. Costs only consisted of time.

Project Development

The continuing educational module was developed and recorded in December 2017 by the co-investigator. The power point presentation and video were converted to an mp4 file for implementation preparation. Educational module content was taken from the literature review regarding vaccine information, barriers to vaccines, and effective communication styles. The NDDOH reviewed the educational module content prior to hosting the module on the website and gave feedback prior to implementation. In addition, the AANP reviewed the educational module content and approved the educational module with accreditation through the AANP website (Appendix A).

The accreditation application and education module were submitted to the AANP CE center on January 4, 2018. It was approved for accreditation on January 24, 2018 for continuing education credit through AANP. The educational module was available for online viewing for all participants on the NDDOH immunization website on February 16, 2018 through March 28, 2018. All participation was voluntary and one hour of free continuing education was granted to all participants who completed the educational module along with the pretest, posttest, and evaluation. The co-investigator sent out individual e-mails to providers in local healthcare facilities known to the co-investigator to help increase the participant sample size. The co-investigator also publicized via word-of-mouth to co-workers in the workplace and university system.

The pretest, posttest, and evaluation surveys were created to measure the effectiveness of the online educational module and were specific to the needs of this project. References were made available to the participants at the end of the educational module. The original intent of the practice improvement project being available on the AANP website had the advantage of the AANP website distributing monthly results from the educational module and surveys. When the necessary switch to the NDDOH website as online host was made, an alternative method of gathering the survey data were created. The surveys, consisting of the pretest, educational module, posttest, evaluation, and certificate of completion, were transferred into online surveys using North Dakota State University's Qualtrics software. This allowed a congruency and ease of flow for the project and participants as well as a way for participant confidentiality to be maintained with its use. By using Qualtrics, the co-investigator was able to develop the surveys into one web link to place the module on the NDDOH website. Implementation of the module took place between February 2018 through March 2018.

Table 4

Project Timeline

Task	**Date**
Literature Review	July 2017 – December 2018
Proposal Meeting	December 1, 2017
Development of Module Content	December 2017
NDDOH Approval	January 17, 2018
Accreditation through AANP	January 24, 2018
IRB Approval	February 2, 2018
Project Implementation	February 16, 2018 – March 28, 2018
Data Gathering	February and March 2018
Results	March and April 2018
Defense Meeting	April 13, 2018

Project Dissemination

This project was disseminated during two poster presentations. First, a poster was presented in April 2017 at the Diabetes Summit Conference in Bismarck, ND at the Radisson Hotel. The poster will be presented a second time at NDSU Nursing at Sanford Health campus in Bismarck, ND on May 2, 2018. A plan for submission to publication is being pursued with The Journal for Nurse Practitioners at the end of May 2018.

International Review Board Approval

The project was certified as exempt by the North Dakota State University Institutional Review Board on February 2, 2018 (Appendix B). Human subjects involved in the project included all healthcare providers. Women and men of all races were included to participate in the study. The project did not require signed consent. Participants gave their voluntary consent by beginning and completing the module. The participant had the option to choose to stop participating in the educational module at any time, without penalty. All responses and participation were kept confidential through the use of Qualtrics software. The surveys did not ask for individual names of the participants. Participant license number or a unique identifier was requested from the AANP for certification. If the individual did not have a license number or did not want to provide their license number, the last four digits of the telephone number, giving them a unique identifier was requested from the AANP. One of these two options were necessary in order to receive educational credit to be tracked by the AANP. The primary and co-investigators did not track license numbers or link them to individual participant's surveys and this information was kept confidential electronically by the co-investigator.

Anyone viewing the website had the option to participate, as membership was not a requirement in order to complete the one hour of continuing education. Their continuing

education credit was provided electronically to the participant through the use of Qualtrics software upon completion of the module and surveys. No other compensation was provided through the project.

Nurse Practitioners and other healthcare providers use online learning modules, such as those found on the NDDOH website, as a means to stay up-to-date on the most current research and guidelines, to increase knowledge regarding practice, and to complete requirements for continuing their education in order to maintain their certification obligations as required to keep up their current licensure. Therefore, the practice improvement project hoped to use the continuing education as adequate incentive for participants.

Potential benefits of the project to the subjects included increased knowledge regarding communication styles and childhood vaccines and allowing the healthcare provider to better counsel and recommend vaccines to their patients. Other potential benefits could have included an intent to change practice behavior, increased vaccination rates, and a decreased rate of vaccine-preventable diseases. The intended result of the knowledge gained was to possibly affect communication and increase vaccination rates.

Participation in the practice improvement project did not involve direct contact and therefore provided minimal risk to the participants. No other identifying data, besides the participants license number or last four digits of their phone number was collected via the pretest, posttest, or evaluation. Participant information was kept confidential. Results and data were provided by the pretest, posttest, and evaluation through the use of Qualtrics software. The module was created and accredited in accordance with the AANP CE policies and standards.

Data Collection

Prior to participation in the educational module, participants were asked to complete the pretest to evaluate their existing knowledge. Upon successful completion of the module, participants were then asked to complete the posttest and evaluation. The pretest consisted of 10 questions and posttest consisted of 9 questions to assess the participant's knowledge of effective communication styles, barriers to vaccinations, and healthcare provider interventions. Questions were mainly multiple choice with a few fill in the blank and select all that apply questions. The evaluation consisted of 13 questions, both multiple choice and fill in the blank with a focus on demographic questions related to overall effectiveness and satisfaction with the continuing education module.

The data were collected from the pretest, posttest, and evaluation questions by using Qualtrics software. The results were compiled after approximately 6 weeks. Data were received from February and March of 2018. Only participants that completed all the required components were included in the data analysis.

CHAPTER FOUR. EVALUATION

Evaluation Methods

Pretest and posttest questions were created based upon learning objectives of the continuing education module (Appendix C and D). Demographic data were collected with the evaluation. Participants were asked to share their gender, number of years of healthcare experience, area of practice, role in healthcare, and how often they provide care to the pediatric patient. Reponses included: a) Always, b) Often, c) Sometimes, d) Rarely, and e) Never.

The pretest consisted of 10 questions used to evaluate the participants' knowledge of effective communication styles, barriers to vaccinations, and healthcare provider interventions, prior to starting the module. Following the completion of the module, a posttest with the same questions was completed by the participant. Descriptive statistics from the two surveys were compared to evaluate the effectiveness of the continuing education module. Upon completion of the posttest, participants were required to complete an evaluation form and provide feedback on the effectiveness of the educational module.

The first learning objective was to recognize factors contributing to current childhood vaccination rates. This was evaluated by 1 pretest and 1 posttest question using quantitative data. Approximately 2 1/2 minutes of lecture was spent discussing this topic. This question was as follows: "Which of the following are factors contributing to the current childhood vaccination rates?" Responses included: a) Increasing parental concerns about vaccines for their children, b) Decrease in the rate of vaccine exemptions for kindergarten, c) Increase in the use of alternative vaccination schedules, d) Both A & C, and e) All of the above.

The second learning objective was to identify barriers, communication styles, and healthcare provider interventions that affect childhood vaccinations. This was evaluated by 3

pretest and 3 posttest questions using quantitative data. Approximately 11 minutes of lecture was spent discussing vaccine barriers, 9 minutes discussing communications styles with three associated case studies, and 3 1/2 minutes discussing healthcare provider interventions. The first question was as follows: “Which of the following are barriers affecting childhood vaccination rates? Select all that apply.” Responses included: a) Concern regarding safety and necessity of vaccines, b) Concern about side effects, c) Concern about the number of vaccines required, d) Effective communication, and e) Moral or religious beliefs. The second question was as follows: “According to literature, effective communication styles include all of the following except:”. Responses included: a) Using a guiding style, b) Using a directing style, c) Using motivational interviewing, and d) Using a presumptive style. The third question was as follows: “Healthcare provider interventions to aid in increased vaccination include all of the follow except:”. Responses included a) Counseling, b) Maximizing opportunities, c) Avoiding combination vaccines, d) Improving accessibility of vaccines, e) Using paper charting, and f) Both C & E.

The third learning objective was to identify effective communication styles for healthcare providers. This was evaluated by 1 pretest and 1 posttest question using quantitative data. Approximately 4 1/2 minutes of lecture was spent discussing this topic with two associated case studies. This question was as follows: “According to literature, effective communication styles include all of the following except:”. Responses included: a) Using a guiding style, b) Using a directing style, c) Using motivational interviewing, and d) Using a presumptive style.

The fourth learning objective was to report enhanced confidence in provider practice when discussing childhood vaccines with parents after viewing the educational module while drawing from their previous experience. This was evaluated by 1 evaluation question using quantitative and qualitative data. This question was as follows: “I feel more comfortable as a

result of this educational module discussing childhood vaccines with my patients and/or their parents:". Responses included: a) Strongly agree, b) Agree, c) Neutral, d) Disagree, and e) Strongly disagree.

Additional evaluation questions were included after the posttest and were utilized to broadly assess the effectiveness of the learning module and objectives. At the completion of the educational module, the participants were asked to respond to the following statement: "As a result of this educational activity:". Responses included: a) I will modify my current practice, b) I will seek more information before modifying my practice, and c) I do not see a need to modify my practice. Finally, the participants were asked, "I plan to discuss childhood vaccines with my patients at every opportunity:". Responses included: a) Strongly agree, b) Agree, c) Neutral, d) Disagree, and e) Strongly disagree.

CHAPTER FIVE. RESULTS

Presentation of Findings

Data reports from the continuing education module were collected through the use of Qualtrics software from February 16. 2018 to March 28, 2018. A total of 16 participants received continuing education certificates for the completion of the pretest, educational module, posttest, and evaluation questions. The completion rate was 76% as 21 participants started the online module but did not complete all the required components in order to receive a certificate of continuing education. The findings for the project included only data from the 16 participants who completed the pretest, educational module, posttest, and evaluation.

Summary of Participant demographics

The majority of the participants were female, with 18.8% being male. Over half of the participants had over 10 years of healthcare experience. Most of the participants' areas of practice were in Family Medicine. Nurse Practitioners comprised the greater part of participants pertaining to role.

Table 5

Participant Demographics

Demographics	**(%)**	**(n)**
Gender		
Male	18.8	3
Female	81.3	13
Years of Practice		
<5 Years of Practice	6.3	1
5-10 Years of Practice	31.3	5
10-20 Years of Practice	37.5	6
>20 Years of Practice	25	4
Area of Practice		
Family	62.5	10
Public Health	25	4
Acute Care	12.5	2
Role in Healthcare		
Nurse Practitioner	37.5	6
Nurse Practitioner Student	18.8	3
Physician Assistant	6.3	1
Physician	6.3	1
Nursing Staff	18.8	3

Summary of Pretest and Posttest Results

In response to how often participants reported that they provided care to pediatric patients, 43.8% reported “often”, 31.3% reported “sometimes”, 18.8% reported “always”, and 6.3% reported “rarely”. The majority of participants reported that “hardly any (<20%)” of their pediatric parents were vaccine-hesitant, this consisted of 37.5% of the participants. Of the remaining participants, 25% reported “I have no idea”, 18.8% reported “half (50%)”, 12.5% reported “a few (20-40%), and 6.3% reported “most (>50%)”.

Before the educational module, 62.5% of the participants reported that they "always" addressed vaccines with their pediatric population at every visit, 25% "often" addressed vaccines, and 12.5% "never" addressed vaccines with their pediatric population at every visit. The responses for why they never address vaccines was consistent in stating that they work in specialty areas. After the module, 81.3% of the participants reported that they planned to "always" address vaccines with their pediatric population at every visit, 12.5% stated they planned to "often" address vaccines, and 6.3% stated they planned to "rarely" address vaccines. The response for why they planned to rarely address vaccines was that "I work in an emergency department." There were no barriers noted if they were not addressing vaccines.

Before the educational module, 12.5% of the participants stated that they were "extremely" familiar with effective communication styles, 50% "moderately", and 25% "somewhat", and 12.5% "slightly" familiar. After the module, 37.5% of the participants stated that they were "extremely" familiar with effective communications styles. The remaining 62.5% reported they were "moderately" familiar.

Before the educational module, 50% of the participants reported that they were currently using a "guiding" style of communication, 37.5% reported a "directing" style, and the remaining 37.5% reported using "motivational interviewing". After the module, 62.5% of the participants reported that they are currently using a "guiding" style of communication, 12.5% reported a "participatory" style, and the remaining 25% reported using "motivational interviewing".

Before the educational module, 31.3% of the participants reported that they plan to use a "guiding" style of communication, 6.3% reported a "directing" style, 18.8% reported a "participatory" style, and 43.8% reported using "motivational interviewing". After the module,

46.7% of the participants reported that they plan to use a "guiding" style of communication, 12.5% reported a "participatory" style, and 37.5% reported using "motivational interviewing."

Table 6

Comparison of Results of Pretest and Posttest Surveys

Before the Module Responses	**percent (%)**	**number (n)**	**After the Module Responses**	**percent (%)**	**number (n)**
Currently address vaccines at every visit			**Plan to address vaccines at every visit**		
Always	62.5	10	Always	81.3	13
Often	25	4	Often	12.5	2
Sometimes	0	0	Sometimes	0	0
Rarely	0	0	Rarely	6.3	1
Never	12.5	2	Never	0	0
Familiarity with effective communication styles					
Extremely	12.5	2	Extremely	37.5	6
Moderately	50	8	Moderately	62.5	10
Somewhat	25	4	Somewhat	0	0
Slightly	12.5	2	Slightly	0	0
Not at all	0	0	Not at all	0	0
Currently using ___ communication style when discussing vaccines with their patients					
Guiding	50	8	Guiding	62.5	10
Directing	12.5	2	Directing	0	0
Participatory	0	0	Participatory	12.5	2
Motivational Interviewing	37.5	6	Motivational Interviewing	25	4
Presumptive	0	0	Presumptive	0	0
Plan to use ___ communication style when discussing vaccines with their patients					
Guiding	31.3	5	Guiding	46.7	8
Directing	6.3	1	Directing	0	0
Participatory	18.8	3	Participatory	12.5	2
Motivational Interviewing	43.8	7	Motivational Interviewing	37.5	6
Presumptive	0	0	Presumptive	0	0

Qualitative Data

The majority of the participants (75%) reported that they planned to modify their current practice as a result of the educational module. The remaining 6.3% reported "I will seek more information before modifying my practice", and 18.8% reported "I do not see a need to modify my current practice". None of the participants who did not see a need to modify or those that would seek more information prior to modifying entered any comments in the space provided as an explanation.

Participants were able to provide additional comments in response to those who planned to modify their current practices in regards to addressing vaccines. Comments included the following: "increase my rate of discussing vaccines with pediatric patients and their families", "communication styles", "improve communication skills with parents on vaccinations", "establish trust and address vaccines at every visit", "utilize more evidence-based language and refer to literature", "generally use guiding style but may use some of the other effective styles mentioned here based on assessment of the parent/guardian", "use my style along with presumptive style."

Satisfaction with the Educational Module

Most of the participants reported a high level of satisfaction with the educational module. A majority of the participants (87.5%), reported that the educational module met the stated objectives, having indicated "strongly agree" or "agree". The remaining 12.5% reported "neutral". Of the participants, 93% selected that they either "strongly agree" or "agree" that the content was free from commercial bias and that the content provided a fair and balanced coverage of the topic. The remaining 6.3% reported "neutral".

A majority of the participants reported that they felt more comfortable as a result of the educational module when discussing childhood vaccines with patients, as 56.3% reported "strongly agree", 37.5% reported "agree", and the other 6.3% reported "neutral". When the participants were asked what they found most helpful, the responses included the following statements: "having examples of how to use guiding, presumptive, or motivational interviewing styles in communication with patients", "great overview, I think seasoned providers would greatly benefit from this module", "good info overall, good case studies", "a different yet effective way to communicate and encourage vaccinations", and "good information as I am new to public health and vaccinations."

Table 7

Evaluation of the Educational Module Results

Evaluation	(%)	(n)
Program met the stated objectives		
Strongly agree	62.5	10
Agree	25	4
Neutral	12.5	2
Disagree	0	0
Strongly disagree	0	0
Content was free from commercial bias		
Strongly agree	75	12
Agree	18.8	3
Neutral	6.3	1
Disagree	0	0
Strongly disagree	0	0
Content provided a fair and balanced coverage of the topic		
Strongly agree	56.3	9
Agree	37.5	6
Neutral	6.3	1
Disagree	0	0
Strongly disagree	0	0
Plan to modify current practice		
I will modify my current practice	75	12
I will seek more information before modifying my practice	6.3	1
I do not see a need to modify my practice	18.8	3
Feel more comfortable as a result of the educational module when discussing childhood vaccines with patients		
Strongly agree	56.3	9
Agree	37.5	6
Neutral	6.3	1
Disagree	0	0
Strongly disagree	0	0

Objective One

The first objective was to recognize factors contributing to the current childhood vaccination rates. Prior to completing the educational module 56.3% of participants answered the following question correctly, “Which of the following are factors contributing to the current childhood vaccination rates?”. The correct response was: both A & C; increasing parental concerns about vaccines for their children and increase in the use of alternative vaccination schedules. Following completion of the educational module 62.5% of participants answered the question correctly.

Objective Two

The second objective was to identify barriers, communication styles, and healthcare provider interventions that affect childhood vaccinations. Prior to completing the educational module, 18.8% of participants answered the following question correctly, “Which of the following are barriers affecting childhood vaccination rates? Select all that apply”. The correct responses were: “concern regarding safety and necessity of vaccines, concern about side effects, concern about the number of vaccines required, and moral or religious beliefs”. Following completion of the educational module 68.8% of participants answered the question correctly.

This objective was also measured by the question, “According to literature, effective communication styles include all of the following except:”. Prior to completing the educational module 37.5% of participants answered the question correctly. The correct response was: “using a directing style”. Following completion of the educational module 68.8% of participants answered the question correctly.

This objective was also measured by the question, “Healthcare provider interventions to aid in increased vaccination include all of the following except:”. Prior to completing the

educational module 68.8% of participants answered the question correctly. The correct response was: both C & E, “avoiding combination vaccines and using paper charting”. Following completion of the educational module, 75% of participants answered the question correctly, identifying healthcare provider interventions that affect vaccinations.

Objective Three

The third objective was to identify effective communication styles for healthcare providers. Prior to completing the educational module 37.5% of participants answered the following question correctly, “According to literature, effective communication styles include all of the following except:”. The correct response was: “using a directing style”. Following completion of the educational module 68.8% of participants answered the question correctly.

Objective Four

The fourth objective was to report enhanced confidence in provider practice when discussing childhood immunizations with parents after viewing the educational module while drawing from previous experience. After completion of the educational module 56.3% of participants answered “strongly agree”, 37.5% answered “agree”, and 6.3% answered “neutral” to the following question, “I feel more comfortable as a result of this educational module discussing childhood vaccines with my patients and/or their parents”.

CHAPTER SIX. DISCUSSION AND RECOMMENDATIONS

Interpretation of Results

Knowles' theory of andragogy was used to guide the development and implementation of the continuing education module to increase provider knowledge of communication styles regarding childhood vaccinations. The theory of andragogy was a relevant theoretical framework used to guide the continuing educational module as online modules are geared towards adult learners. Participants were able to build on previous experiences with vaccine communication in order to enhance confidence and learning through the theoretical framework. Healthcare providers are required to complete continued education for their license; therefore, this theory plays an important role. The five assumptions were evaluated by completion of the educational module, feedback provided on the evaluations, increase in results on the posttest when compared to the pretest, and a report on enhanced confidence in provider practice, and therefore was a useful theory to guide this practice improvement project.

The co-investigator found evidence in the literature and results from the project that suggest the need for more support for healthcare provider education regarding effective communication styles and vaccines in order to help increase immunization rates among the pediatric population. Awareness and knowledge have been found to increase a healthcare provider's willingness to recommend vaccines. Healthcare providers also remain the most trusted advisor and influencer of vaccine decisions (Paterson et al., 2016). Participant responses reflected an increased intent from the healthcare providers to discuss childhood vaccines with their patients at every visit. Due to the small sample size and inclusion of nursing staff, the co-investigator was not able to make generalizations of the results to the larger population of the providers in the Midwest. However, the participants all demonstrated increased understanding of

the module content and improved scores regarding effective communication styles, which helps demonstrate the effectiveness of this practice improvement project and utility for further projects and research in this area.

The participants of the educational module reported overall satisfaction with the continuing educational module, showing agreement that the module met the stated objectives, the content was free from commercial bias, and that the content provided a fair and balanced coverage of the topic. A majority of the participants stated that they planned to modify their current practice after viewing the educational module, and that they felt more comfortable as a result of the educational module when discussing childhood vaccines with their patients. The interpretation of the results showed an increase in provider intent and knowledge regarding effective communication styles. Provider quality of communication can impact vaccination intent by parents and influence vaccination rates (Gilkey et al., 2015).

Each objective was met by evaluating the pretest, posttest, and evaluation questions. Following completion of the educational module, each objective showed an increased rate in correct answers when compared to the pretest. For objective one, there was a 6.2% increase between the pretest and posttest questions, recognizing factors contributing to current childhood vaccination rates. For objective two, there was a 50% increase between the pretest and posttest question, identifying barriers that affect childhood vaccinations. There was 31.3% increase between the pretest and posttest question, identifying effective communication styles for healthcare providers. There was also a 6.2% increase between the pretest and posttest question, identifying healthcare provider interventions that affect childhood vaccinations. For objective three, there was a 31.3% increase between the pretest and posttest question, identifying effective communication styles for healthcare providers. For objective four, 93.8% of the participants

answered that they feel more comfortable as a result of the educational module, showing enhanced confidence in provider practice when discussing childhood immunizations with parents.

It is important to use a website with more provider traffic, such as the American Association of Nurse Practitioners or the American Nurses Credentialing Center to host an educational module such as this in order to improve participation and increase the sample size. The NDDOH Immunization website would have been more beneficial if their continuing education was more publicized. To aid in the participation of the project, the co-investigator sent out emails to local healthcare providers and Nurse Practitioner students. The NDDOH site also targeted more nurses and providers from a public health area; this likely affected participation from providers in family practice. The largest factor impacting participation in this project included having to switch the venue from the AANP to the NDDOH for implementation. With short notice, the AANP no longer hosted modules from outside sources as of January 1st, 2018 due to copyright issues. Therefore, various health-related websites were contacted for availability to host the educational module (such as the North Dakota Nurse Practitioner Association, the North Dakota Center for Nursing, the North Dakota Department of Health, American Nurses Association, NP Central, and Practicing Clinicians Exchange). The NDDOH website was the only website whose contact responded to the co-investigator. Therefore, the late change in host site also impacted the timeframe the module was available to potential participants from the originally proposed 2-month timeframe to the 6-week timeframe implemented for this practice improvement project. More limited time to publicize the educational module to aid in increased participation was also impacted by switching host sites. Due to the NDDOH website being a local versus national population target, the participant pool was smaller than originally targeted.

Additional factors affecting attrition rates for completion of the educational module could have been due to needing to identify license number or phone number for AANP certification. After data analysis, there were 76% of participants who received a certificate of completion for completing all components of the module that included the pretest, educational module, posttest, and evaluation. Two participants notified the co-investigator of technical difficulties, specifically not being able to access the module link to the website. The link access was resolved independently of any intervention by the co-investigator quickly, lending to the possibility that the website may have been experiencing technical difficulties at that particular time and both participants were able to complete the educational module at a later time. A reasonable conclusion may have been that the rate of completion may have been higher if the online educational module would not have had any possible technical difficulties.

There were other factors that could have changed the interpretation of the results. When looking at the results of the pretest and posttest, 25% of the participants answered "I have no idea" when asked how many of their pediatric population was vaccine-hesitant. This could have affected the results as no comments were provided explaining this response. Perhaps the participant did not need to address vaccines or ask their patients about vaccines during their visits. There was no place to indicate that they did not provide care to the pediatric population. There were no comments provided by participants who responded with either "no need to modify" or "seek additional information." This could have been affected by the additional time needed to enter a reason, the participant being unsure of a reason, or specialty provider that maybe do not address vaccines at every visit.

All the participants felt that learning was increased regarding the topic. The qualitative data were favorable to support the education topic and modality and this may, in turn, help to

increase vaccination rates by increasing awareness. If the provider does not need to address vaccines, then no change is likely, therefore, targeting healthcare providers that impact the pediatric population was key.

Online modules are a good modality for practice improvement projects. Online learning is an effective way to improve knowledge and health outcomes for the healthcare provider and their patients (Pullen, 2006). Online learning has been found to be a convenient learning format for an educationally and geographically diverse population that healthcare providers are (Pullen, 2006).

Limitations

A number of limitations were associated with this practice improvement project. First, there was a change in the hosting site during the implementation process of this project. It was originally planned to be hosted on the American Association of Nurse Practitioner's website. As of January 1, 2018, they no longer hosted modules from outside sources due to copyright issues (Appendix E). Since the online module was hosted on the North Dakota Department of Health website, there was a limited number of viewers, which largely targeted public health providers and nursing staff. The module was not advertised or publicized on the website unless the participant knew to look for education on the *Immunization* link on the website. Therefore, the co-investigator largely publicized by formal invitation via e-mail and word of mouth to enhance participation rates. Of possible benefit to this limitation, however, was that more healthcare providers could potentially have become more aware of educational opportunities on the NDDOH Immunization website to those who participated in this practice improvement project. Being hosted by the AANP would have allowed for a potentially larger sample size and more availability to healthcare providers, such as Nurse Practitioners, nationwide versus the state of

North Dakota. Hosting the educational module on the NDDOH also changed the process of data collection, as the AANP would have collected the data and sent reports to the co-investigator on a monthly basis. By hosting on the NDDOH, the co-investigator collected and analyzed the data on an individual basis. A larger sample size would have allowed for more possible generalizations to healthcare providers throughout the nation and further increased the population that would have been impacted by the module, thus possibly increasing awareness or practice change for immunization rates.

A second limitation was the the limited length of time to implement the project due to a change in site and target population. The educational module was initially planned to be open to participants over a two-month timeframe and be open to a nationwide population, which would have likely been adequate time to collect an appropriate participation rate. With the change to a more localized website, the likely pool of participants was from the state of North Dakota and included more of a public health background. The decreased target population also resulted in decreased participation. The time to allow the NDDOH to review the educational module content and prepare the necessary paperwork limited the project implementation to 6 weeks, thus likely contributing to lower participation rates. With more time for implementation, there could have been an increased sample size and better representation of healthcare providers throughout the state of North Dakota.

A third limitation was that the option “n/a” or “not applicable” should have been added as an answer to the evaluation questions “How many years of healthcare experience do you have?”, “What is your area of practice?”, “What is your role in healthcare?”, and “How often do you provide care to pediatric patients?”. All of the participants may not work in healthcare. Also, not all healthcare providers and staff provide care to pediatric patients. The questions were not

originally intended to include nursing staff, but after switching sites from the AANP to NDDOH, the target population became broader and included more nursing staff as well as providers such as NPs and PAs. This could have potentially altered the results in that aspect. The option "n/a" or "not applicable" should have been added as an answer to the pretest and posttest questions "How often do you address vaccines with your pediatric population at every visit?" and "What percentage of your pediatric population parents are vaccine-hesitant." This could have potentially altered the results as not all of the participants may provide care to pediatric patients.

A fourth limitation was that the option of free text entry should have been added as an answer to the pretest and posttest questions "I am currently using _____ style when discussing vaccines with my patients and their parents" and "I plan to use _____ style when discussing vaccines with my patients and their parents." This could have potentially altered the results as the participants may use other communication styles than the ones listed.

Finally, since this was an online learning module, technical difficulties did exist, as evidenced by two participants who notified the co-investigator of being unable to open the link to the educational module. The co-investigator did receive feedback from two participants stating that when they clicked on the module link they got an error message that read "can't reach this page". These both happened on the same day; there was no indication to know if this was happened other days as well. This problem was resolved quickly but could have potentially altered the results for others potentially trying to access the educational module during that time. Only the participants who completed all the aspects of the educational module and surveys were included in the final results. After data analysis, there were 21 participants who initiated the online module and only 76% of participants received a certificate of completion for completing all components that included the pretest, educational module, posttest, and evaluation. One could

make an educated guess that the rate of completion could have been higher if the online educational module would not have any technical difficulties.

Recommendations

The educational module received positive results overall and showed enhanced learning among the participants. The co-investigator felt it would have been reasonable to better disseminate the educational module, or other educational modules that pertain to this population, to any/all providers that impact the pediatric population. The continuing educational module will continue to be available on the North Dakota Department of Health Immunization website until May 31, 2018. Data will no longer be collected for the purpose of this project, but this will allow healthcare providers to have the opportunity to complete the learning module and receive 1 hour of continuing education credits beyond just the confines of this practice improvement project. The co-investigator felt it would be beneficial to reach as many participants as possible to impact learning and awareness.

The co-investigator recommends that further educational modules for healthcare providers be created regarding effective communication and vaccines in order to help increase immunization rates among the pediatric population, based off the findings from the literature review and this project. Ventola (2016) indicated that absent or weak recommendations from healthcare providers are a cause of poor vaccine acceptance. Another recommendation is that online educational modules, such as the focus of this project, be incorporated into each states' vaccine education for healthcare providers. Online learning is an effective way to improve knowledge and health outcomes for the healthcare provider and their patients (Pullen, 2006).

Vaccines are being administered and discussed in a variety of healthcare settings, including, but not limited to, family practice, public health, specialty practice, inpatient hospital,

schools, pharmacies, acute care, and emergency services. In the future, educational modules on vaccines and communication strategies could be beneficial for all pediatric healthcare providers including nurse practitioners, physicians, physician assistants, and pharmacists. The NDDOH allowed anyone to participate in the online continuing education activities. Awareness of the educational opportunity was likely lower to other areas of practice outside of the state. For future implementation, the module could be made available to other online hosting sites for broader access and availability. If future educational modules were to be hosted on multiple online sites, a larger participant pool would be generated, improving sample size and statistical analysis to better generalize findings to a broader population, thus enhancing application, findings, and dissemination.

To aid in improvement of future projects hosted on the NDDOH website, the co-investigator recommends that the length of implementation would be extended to six months, perhaps less time if adequate participation is elicited. Publicizing the educational module with the state hospitals, clinics, and communities could benefit future similar practice improvement projects as well. Possibly contacting the website's list-serve of available members or providers known to the organization might be another way to increase publicity of the continuing educational opportunities in future practice improvement projects. Reminder e-mails or follow-up for potential participants would also likely enhance future practice improvement projects' participation rates.

Implications for Practice

This practice improvement project was significant because it added to the available educational resources to have enhanced healthcare provider knowledge about effective communication and vaccines. By utilizing the AANP CE Center for accreditation, the project

was allowed to provide 1 continuing education credit to participants upon completion of the pretest, online module, posttest, and evaluation. By utilizing the NDDOH Immunization website, the project was allowed to be available to a variety of healthcare providers ranging from nursing staff to physicians. Knowledge of effective communication regarding childhood vaccines helped to possibly improve immunization rates in the pediatric population.

The use of vaccines in practice has shown growth in previous years in all areas of healthcare. Healthcare providers in these areas faced barriers with their patient populations when discussing vaccines. Completing educational modules regarding effective communication techniques had the potential to show enhanced communication between the healthcare provider and patient and aided in establishing a trusting relationship.

Implications for Future Research

Based on the literature review, pretest, posttest, and evaluation findings, the practice improvement project supported that healthcare providers need further education on communication styles and addressing vaccines in general. According to research, awareness and knowledge have been found to increase a healthcare providers willingness to recommend vaccines (Paterson et al., 2016). As a result of the educational module, healthcare providers reported that they had an intent to modify their practice. Evidence-based research on a more standardized process to increase vaccination rates and education on communication styles is needed. There has been an improvement in childhood vaccination rates in the U.S, yet vaccine rates are still inadequate. The recommendation for vaccination from a healthcare provider has been shown to play a vital part in parental decisions regarding vaccines for their children. Effective communication can positively affect immunization rates (CDC, 2015b). Increased competence in effective communication could translate into better care for patients when

educating and discussing other entities such as opioids and antibiotics with the patient population. The pretest, posttest, and evaluation findings of this practice improvement project demonstrated that results of future research can be effectively disseminated via online educational modules as supported by articles describing online research modalities (Pullen, 2006).

Applications to Other Nurse Practitioner Roles

Nurse Practitioners in all areas of practice need to work together collaboratively for the best patient outcomes. Nurse Practitioners are often known for being thorough, understanding, and having time to listen to the patients. Knowledge of effective communication regarding vaccines will help the NP communicate more effectively with his or her patient population. By gaining knowledge of effective communication, the NP can be further involved in treating the patient holistically. The educational module enhanced the application to the NP role as a scholar, innovator, and clinician. An NP is a scholar by researching evidence-based practice and disseminating findings, such as the purpose of this dissertation project. An NP is an innovator by designing interventions in order to implement them into practice, such as designing this educational module in order to allow access to NPs and other healthcare providers throughout the state. An NP is a clinician by improving healthcare through patient outcomes, such as the co-investigator, possibly improving communication regarding vaccines through provider/nursing education, thus potentially affecting immunization rates in the state of North Dakota.

Conclusion

Healthcare providers play an important role in the delivery of vaccinations to children. The literature review supported that in order to positively impact vaccination rates, healthcare providers must effectively communicate with parents and develop a trusting relationship. The

practice improvement project included an online educational module to help increase provider knowledge on effective communication when discussing vaccines with the pediatric population. Findings reflected an increase in provider knowledge regarding effective communication and satisfaction with the educational module. Delays in development and implementation limited the overall data collected. Ultimately, gaining enhanced knowledge, awareness, and incorporating effective communication techniques into all healthcare visits has the potential to improve overall health, enhance quality of life, and increase childhood vaccination rates across the U.S.

REFERENCES

American Academy of Pediatrics. (2017). *Common parental concerns.* Retrieved from https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/immunizations/Pages/Common-Parental-Concerns.aspx

American Academy of Pediatrics. (2018). *Vaccine hesitant parents.* Retrieved from https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/immunizations/Pages/vaccine-hesitant-parents.aspx

Anderson, V. (2015). Promoting childhood immunizations. *The Journal of Nurse Practitioners, 11*(1), 1-10. Retrieved from The Journal for Nurse Practitioners: https://doi.org/10.1016/j.nurpra.2014.10.016

Brunner, M. (2014). *Healthcare Providers or Pharmacists Save Lives Every Day.* Retrieved from TelePharm: http://blog.telepharm.com/2014/11/pharmacists-save-lives-every-day/

Brunson, E. (2013). The impact of social networks on parents' vaccination decisions. *Pediatrics, 131*(5). Retrieved from AAP News & Journals: http://pediatrics.aappublications.org/content/131/5/e1397

Callender, D. (2016). Vaccine hesitancy: More than a movement. *Human Vaccines & Immunotherapeutics, 12*(9), 2464-2468. Retrieved from Taylor & Francis Online: http://www.tandfonline.com/doi/full/10.1080/21645515.2016.1178434?src=recsys

Center for Innovation in Research and Training. (n.d.). *Using PowerPoint in a research presentation.* Retrieved from CIRT.

Centers for Disease Control and Prevention [CDC]. (2012). *Talking with parents about vaccines for infants.* Retrieved from https://www.cdc.gov/vaccines/hcp/conversations/downloads/talk-infants-color-office.pdf

Centers for Disease Control and Prevention [CDC]. (2015a). *Guillan-Barre syndrome and flu vaccine.* Retrieved from https://www.cdc.gov/flu/protect/vaccine/guillainbarre.htm

Centers for Disease Control and Prevention [CDC]. (2015b). *The need for strategies to increase immunization levels.* Retrieved from https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/strat.pdf

Centers for Disease Control and Prevention [CDC]. (2016). *Immunization.* Retrieved from https://www.cdc.gov/nchs/fastats/immunize.htm

Centers for Disease Control and Prevention [CDC]. (2017a). *Calculating CE.* Retrieved from https://www.cdc.gov/cecredit/calculating-ce.html

Centers for Disease Control and Prevention [CDC]. (2017b). *Possible side-effects from vaccines.* Retrieved from https://www.cdc.gov/vaccines/vac-gen/side-effects.htm

Centers for Disease Control and Prevention [CDC]. (2017c). *2017 Recommended immunizations for children from birth through 6 years old.* Retrieved from https://www.cdc.gov/vaccines/parents/downloads/parent-ver-sch-0-6yrs.pdf

Centers for Disease Control and Prevention [CDC]. (2017d). *Vaccines & immunizations.* Retrieved from https://www.cdc.gov/vaccines/vac-gen/whatifstop.htm

Centers for Disease Control and Prevention [CDC]. (2017e). *Why are childhood vaccines so important?* Retrieved from https://www.cdc.gov/vaccines/vac-gen/howvpd.htm

Chung, Y., Schamel, J., Fisher, A., & Frew, P. (2017). Influences on immunization decision-making among US parents of young children. *Maternal and Child Health Journal, 21*(12), 2178-2187. Retrieved from Springer Link: https://link.springer.com/article/10.1007/s10995-017-2336-6

Emerson, B. (2018). *N.D. kindergarten vaccination rates increase.* Retrieved from The Bismarck Tribune: http://bismarcktribune.com/news/local/health/n-d-kindergarten-vaccination-rates-increase/article_6005edfa-2d6a-5a7e-bb54-4aeb1481bfa0.html

Esposito, S., Principi, N., & Cornaglia, G. (2014). Barriers to the vaccination of children and adolescents and possible solutions. *Clinical Microbiology and Infection, 20*(5), 25-31. Retrieved from ScienceDirect: https://doi.org/10.1111/1469-0691.12447

Fitzpatrick. (2006). The cutter incident: How america's first polio vaccine led to a growing vaccine crisis. *Journal of the Royal Society of Medicine, 99*(3), 155. Retrieved from US National Library of Medicine: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1383764/

Funk, C., Kennedy, B., & Hefferon, M. (2017). *Public views of media coverage on childhood vaccines.* Retrieved from Pew Research Center: http://www.pewinternet.org/2017/02/02/public-views-of-media-coverage-on-childhood-vaccines/

Gilkey, M., Malo, T., Shah, P., Hall, M., & Brewer, N. (2015). Quality of physician communciation about human papillomavirus vaccine: Findings from a national survey. *Cancer Epidemiology, Biomarkers, & Prevention, 24*(11). Retrieved from DOI: 10.1158/1055-9965.EPI-15-0326

Greenwood, B. (2014). The contribution of vaccination to global health: past, present and future. *Philosophical Transactions, 369*(1645). Retrieved from US National Library of Medicine National Institutes of Health: doi:10.1098/rstb.2013.0433

Gust, D., Kennedy, A., Shui, I., Smith, P., Nowak, G., & Pickering, L. (2005). Parent attitudes toward immunizations and healthcare providers. *American Journal of Preventative Medicine, 29*(2). Retrieved from doi:10.1016/j.amepre.2005.04.010

HealthyChildren.org. (2015a). *History of immunizations.* Retrieved from https://www.healthychildren.org/English/safety-prevention/immunizations/Pages/History-of-Immunizations.aspx

HealthyChildren.org. (2015b). *Your child's first vaccines: What you need to know.* Retrieved from https://www.healthychildren.org/English/safety-prevention/immunizations/Pages/Your-Babys-First-Vaccines.aspx

HealthyPeople.gov. (2017). *Immunization and infectious diseases.* Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases

Healy, C. (2016). *Communicating with parents about vaccines.* Retrieved from Medscape: https://www.medscape.com/viewarticle/866456_2

Immunization Action Coalition. (2016). *Vaccine timeline.* Retrieved from http://www.immunize.org/timeline/

Keeffe, P. (2016). *People who don't get vaccinations cost U.S. economy $7 billion a year.* Retrieved from Healthline: https://www.healthline.com/health-news/vaccinations-cost-us-economy-7-billion-a-year#1

Kennedy, A., LaVail, K., Nowak, G., Basket, M., & Landry, S. (2011). Confidence about vaccines in the United States: Understanding parents' perceptions. *Health Affairs, 30*(6), 1151-1159. Retrieved from doi: 10.1377/hlthaff.2011.0396

Leask, J., Kinnersley, P., Jackson, C., Cheater, F., Bedford, J., & Rowles, G. (2012). Communicating with parents about vaccination: a framework for health professionals. *BMC Pediatrics, 12*(154). Retrieved from BioMed Central: https://doi.org/10.1186/1471-2431-12-154

Mazurek, B., & Fineout-Overholt, E. (2015). *Evidence-Based Practice in Nursing & Healthcare.* St. Louis: Wolters Kluwer Health.

McKee, C., & Bohannon, K. (2016). Exploring the reasons behind parental refusal of vaccines. *The Journal of Pediatric Pharmacology and Therapeutics, 21*(2), 104-109. Retrieved from US National Library of Medicine National Institute of Health: doi:10.5863/1551-6776-21.2.104

Merriam, S., & Bierema, L. (2014). *Adult Learning: Linking Theory and Practice.* San Fransisco: Jossey-Bass.

National Conference State Legislators. (2017). *States with religious and philosophical exemptions from school immunization requirements.* Retrieved from http://www.ncsl.org/research/health/school-immunization-exemption-state-laws.aspx

National Vaccine Advisory Committee. (2015). Assessing the state of vaccine confidence in the United States: Recommnedations from the national vaccine advisory committee. *Public Health Records, 130*(6), 573-595. Retrieved from US National Library of Medicine National Institutes of Health: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4612166/

North Dakota Department of Health [NDDOH]. (2017). *North Dakota epidemiology report.* Retrieved from North Dakota Department of Health Immunizations: http://www.ndhealth.gov/disease/newsletters/epiarchives/currentedition.pdf

North Dakota Department of Health. (n.d.). *School immunization rates.* Retrieved from North Dakota Department of Health Immunizations: http://www.ndhealth.gov/immunize/rates/

Northern Arizona University. (2010). *Adult learning theory.* Retrieved from https://sites.google.com/a/nau.edu/educationallearningtheories/adult-learning-theory-andragogy-by-barbara-miroballi

Offit, P., Quarles, J., Gerber, M., Hackett, C., Marcuse, E., Kollman, T., . . . Landry, S. (2002). Addressing parents' concerns: Do multiple vaccines overwhelm or weaken the infant's immune system? *Pediatrics, 109*(1). Retrieved from Penn State Hospital: http://pediatrics.aappublications.org/content/109/1/124

Opel, D., Heritage, J., Taylor, J., Mangione-Smith, R., Salas, H., DeVere, V., . . . Robinson, J. (2013). The architecture of provider-parent vaccine discussion at health supervision visits. *Pediatrics*. Retrieved from American Academy of Pediatrics: http://pediatrics.aappublications.org/content/early/2013/10/30/peds.2013-2037

Orenstein, W., & Ahmed, R. (2017). Simply put: Vaccination saves lives. *Proceedings of the National Academy of Science of the United States of America, 114*(16), 4031-4033. Retrieved from PNAS: http://www.pnas.org/content/114/16/4031

Paterson, P., Meurice, F., Stanberry, L., Glismann, S., Rosenthal, S., & Larson, H. (2016). Vaccine hesitancy and healthcare providers. *Vaccine, 34*(52), 6700-6706. Retrieved from US National Library of Medicine: https://www.ncbi.nlm.nih.gov/pubmed/27810314

Pullen, D. (2006). An evaluative case study of online learning for healthcare professionals. *The Journal of Continuing Education in Nursing, 37*(5), 225-232. Retrieved from https://doi.org/10.3928/00220124-20060901-04

Robison, S. (2013). Sick-visit immunizations and delayed well-baby visits. *Pediatrics, 132*(1). Retrieved from AAP News & Journals: http://pediatrics.aappublications.org/content/132/1/44

Samuel, L. (2017). *Vaccine exemptions are on the rise in a number of US states.* Retrieved from STAT: https://www.statnews.com/2017/01/20/vaccine-exemptions-states/

Seither, R., Svetlana, M., Knighton, C., Mellerson, J., Singleton, J., & Greby, S. (2014). Vaccination coverate among children in kindergarten - United States, 2013-14 school year. *Morbidity and Mortality Weekly Report, 63*(41), 913-920. Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6341a1.htm

Shelby, A. (2013). How providers and parents can utilize storytelling to combat anti-vaccine misinformation. *Human Vaccines & Immunotherapeutics, 9*(8), 1795-1801. Retrieved from http://www.tandfonline.com/doi/full/10.4161/hv.24828?src=recsys

Stern, A., & Markel, H. (2005). The history of vaccines and immunization: Familiar patterns, new challenges. *Health Affairs, 24*(3). Retrieved from Health Affairs: https://www.healthaffairs.org/doi/full/10.1377/hlthaff.24.3.611

Stewart, E., & Fox, D. (2011). Encouraging patients to change unhealthy behaviors with motivational interviewing. *Family Practice Management, 18*(3), 21-25. Retrieved from American Academy of Family Physicians: http://www.aafp.org/fpm/2011/0500/p21.html

The American College of Obstetricians and Gynecologists. (2014). *Effective patient-physician communication.* Retrieved from https://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Effective-Patient-Physician-Communication

The History of Vaccines. (2017). *Human cell strains in vaccine development.* Retrieved from https://www.historyofvaccines.org/content/articles/human-cell-strains-vaccine-development

Ventola, C. (2016). Immunization in the United States: Recommendations, barriers, and measures to improve compliance. *Pharmacy and Therapeutics, 41*(7), 426-436. Retrieved

from US National Library of Medicine National Institutes of Health: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4927017/

Villacorta, R., & Sood, N. (2015). Determinants of healthcare provider recommendations for influenza vaccinations. *Preventive Medicine Reports, 2*, 355-370. Retrieved from US National Library of Medicine: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4721324/

Williams, S. (2014). What are the factors that contribute to parental vaccine-hesitancy and what can we do about it? *Human Vaccines & Immunotherapeutics, 10*(9), 2584-2596. Retrieved from Human Vaccines & Immunotherapeutics: http://www.tandfonline.com/doi/full/10.4161/hv.28596?src=recsys

Wolicki, J. (n.d.). *Communication with patients about vaccines.* Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/flu/pdf/partners/nivdp-webinar-communicating-with-patients.pdf

APPENDIX A. AANP APPROVAL LETTER

AANP | American Association of NURSE PRACTITIONERS™

The Voice of the Nurse Practitioner®

1/24/2018

Amber Burgad
4905 Inlet Bay Dr.
Mandan, ND., 58554

Dear Amber,

The continuing education activity *"Provider Communication Regarding Childhood Vaccines"*, is approved for continuing education by the American Association of Nurse Practitioners. Activity ID number 18012976 has been assigned to this application. All sessions are approved as submitted. This activity has been approved for 1 year (through January 2019), provided no changes are made.

Use the following statement in your literature to indicate the maximum credit *one person can obtain* upon completion of this activity: "This activity is approved for 1.0 contact hour(s) of continuing education (which includes 0.0 hours of pharmacology) by the American Association of Nurse Practitioners. Activity ID 18012976. This activity was planned in accordance with AANP CE Standards and Policies."

This approval is for the continuing education activity listed in the original application. With this approval, ALL changes to this program must be reported to the AANP for review as soon as they are identified. This includes, but is not limited to:

- session drops/additions
- speaker changes
- objective changes
- date and /or venue changes

Any changes to content or speakers that are not reviewed by the AANP are not approved for credit.

Refer to this activity's ID number with *all communication* pertaining to this application including the required post-activity reports. Attendance sheets and evaluation summaries are due to AANP one month after the activity's initial presentation (no later than March 1, 2019). **Please find important information and instructions attached regarding mandatory post-activity reporting.**

Best Regards,

Leigh Schmidt

Leigh Schmidt, MSN, RN, CMSRN
Director of Accreditation

APPENDIX B. INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

NDSU NORTH DAKOTA STATE UNIVERSITY

February 2, 2018

Dr. Heidi Saarinen
Nursing

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #PH18166, "Provider Communication Regarding Childhood Vaccines: An Educational Module"

Co-investigator(s) and research team: Amber Burgad
Certification Date: 2/2/2018 Expiration Date: 2/1/2021
Study site(s): Online
Sponsor: n/a

The above referenced human subjects research project has been certified as exempt (category #2b) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the original protocol submission (received 1/31/2018) and revised consent letter (received 2/2/2018).

Please also note the following:
• If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
• The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
• Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
• Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.
Sincerely,

Kristy Shirley

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult http://www.ndsu.edu/research/integrity_compliance/irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb
Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX C. PRETEST QUESTIONS

Provider Communication Regarding Childhood Vaccines: Module Pre-Test

1. How often do you address vaccines with your pediatric population at **EVERY** visit?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely
    e. Never

2. If you are currently not addressing vaccines with your pediatric population at every visit, please indicate your reason(s)/barrier(s) below:

_____
_____
_____

3. What percentage of your pediatric population parents are vaccine-hesitant (According to the World Health Organization, vaccine-hesitant parents might be those who delay acceptance for vaccines or refuse them, even if the vaccines are readily available)?
    a. Most (>50%)
    b. Half (50%)
    c. A few (20-40%)
    d. Hardly any (<20%)
    e. I have no idea

4. Before this activity, how familiar are you with effective communication styles?
    a. Extremely
    b. Moderately
    c. Somewhat
    d. Slightly
    e. Not at all

5. Which of the following are factors contributing to current childhood vaccination rates?
    a. Increasing parental concerns about vaccines for their children
    b. Decrease in the rate of vaccine exemptions for kindergartners
    c. Increase in the use of alternative vaccination schedules
    d. Both A&C
    e. All of the above

6. Which of the following are barriers affecting childhood vaccination rates? Select all that apply.
    a. Concern regarding safety and necessity of vaccines
    b. Concern about side effects

c. Concern about the number of vaccines required
d. Effective communication
e. Moral or religious beliefs

7. According to literature, effective communication styles include all of the following except:
    a. Using a guiding style
    b. Using a directing style
    c. Using motivational interviewing
    d. Using a presumptive style

8. Healthcare provider interventions to aid in increased vaccination include all of the following except:
    a. Counseling
    b. Maximizing opportunities
    c. Avoiding combination vaccines
    d. Improving accessibility of vaccines
    e. Using paper charting
    f. Both C & E

9. I am currently using _____ style when discussing vaccines with my patients and their parents.
    a. Guiding
    b. Directing
    c. Participatory
    d. Motivational Interviewing
    e. Presumptive

10. I plan to use _____style when discussing vaccines with my patients and their parents.
    a. Guiding
    b. Directing
    c. Participatory
    d. Motivational Interviewing
    e. Presumptive

APPENDIX D. POSTTEST AND EVAULATION QUESTIONS

Provider Communication Regarding Childhood Vaccines: Module Post-Test

1. How often do you plan to address vaccines with your pediatric population at **EVERY** visit after viewing this module?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely
    e. Never

2. If you do not plan to address vaccines with your pediatric population at every visit, please indicate your reason(s)/barrier(s) below:

_____
_____
_____

3. After this activity, how familiar are you with effective communication styles?
    a. Extremely
    b. Moderately
    c. Somewhat
    d. Slightly
    e. Not at all

4. Which of the following are factors contributing to current childhood vaccination rates?
    a. Increasing parental concerns about vaccines for their children
    b. Decrease in the rate of vaccine exemptions for kindergartners
    c. Increase in the use of alternative vaccination schedules
    d. Both A&C
    e. All of the above

5. Which of the following are barriers affecting childhood vaccination rates? Select all that apply.
    a. Concern regarding safety and necessity of vaccines
    b. Concern about side effects
    c. Concern about the number of vaccines required
    d. Effective communication
    e. Moral or religious beliefs

6. According to literature, effective communication styles include all of the following except:
    a. Using a guiding style
    b. Using a directing style

c. Using motivational interviewing
d. Using a presumptive style

7. Healthcare provider interventions to aid in increased vaccination include all of the following except:
    a. Counseling
    b. Maximizing opportunities
    c. Avoiding combination vaccines
    d. Improving accessibility of vaccines
    e. Using paper charting
    f. Both C & E

8. I am currently using _____ style when discussing vaccines with my patients and their parents.
    a. Guiding
    b. Directing
    c. Participatory
    d. Motivational Interviewing
    e. Presumptive

9. I plan to use _____style when discussing vaccines with my patients and their parents.
    a. Guiding
    b. Directing
    c. Participatory
    d. Motivational Interviewing
    e. Presumptive

Provider Communication Regarding Childhood Vaccines: Module Evaluation

1. What is your gender?
    a. Male
    b. Female

2. How many years of healthcare experience do you have?
    a. < 5 years
    b. 5-10 years
    c. 10-20 years
    d. > 20 years

3. What is your area of practice?
    a. Family practice
    b. Women's health
    c. Pediatrics
    d. Acute care
    e. Other (Please list.) _____

4. What is your role in healthcare?
    a. Nurse Practitioner
    b. Physician
    c. Physician Assistant
    d. Nursing staff
    e. Other (Please list.) _____

5. How often do you provide care to pediatric patients?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely
    e. Never

6. Do you feel this program met the stated objectives?
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

7. Do you feel the content was free from commercial bias? (Please comment if you answer "D" or "E")

a. Strongly agree
b. Agree
c. Neutral
d. Disagree _____
e. Strongly Disagree _____

8. Do you feel the content provided a fair and balanced coverage of this topic? (Please comment if you answer "D" or "E")
   a. Strongly agree
   b. Agree
   c. Neutral
   d. Disagree _____
   e. Strongly Disagree _____

9. As a result of this educational activity:
   a. I will modify my current practice.
   b. I will seek more information before modifying my practice.
   c. I do not see a need to modify my practice

10. If you plan to modify your practice, please indicate in what way(s):

_____
_____
_____

11. I plan to discuss childhood vaccines with my patients at every opportunity:
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

12. I feel more comfortable as a result of this educational module discussing childhood vaccines with my patients and/or their parents:
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

13. Please provide specific comments for this program or what you found most helpful as a result of this educational module:

_____
_____

APPENDIX E. AANP EMAIL

From: Leigh Schmidt <LSchmidt@aanp.org>
Date: January 4, 2018 at 4:50:41 PM CST
To: Amber Burgad <amburgad@hotmail.com>
Subject: RE: AANP Accreditation Application - Preliminary 1 of 2

Hello Amber,

Thank you for your application. At this time, AANP is no longer hosting activities that are developed from external sources in our CE Center due to copyright issues. We can accept this submission for accreditation consideration; however, you will be required to locate another site to host the activity if you would like it to remain as an online enduring activity.

Please let me know if you have any additional questions, and how you would like to proceed with this application.

Best Regards,
Leigh

Leigh Schmidt, MSN, RN, CMSRN
Accreditation Manager
American Association of Nurse Practitioners
901 South MoPac Expressway
Building II, Suite 450
Austin, Texas 78746
www.AANP.org

APPENDIX F. MEDPAGE TODAY EMAIL

Permission to use MedPage Today video

Peggy Peck <p.peck@medpagetoday.com>

Mon 12/18/2017 2:54 PM

To:Burgad, Amber <amber.burgad@ndsu.edu>;

Cc:John Gever <j.gever@medpagetoday.com>; Caroline Hurst <churst@everydayhealthinc.com>;

Ms. Burgad,
Thank you for inquiring about the MedPage Today video. I'm happy to grant you permission to use the video in its full, original form. We do not authorize edits (cutting or additions). You can use this link:
http://medpagetoday.s3.amazonaws.com/media/42xxx/42656_wide.mp4

Regards,

Peggy Peck

Peggy Peck
Vice President/Editor-in-Chief
P.peck@medpagetoday.com
p: 646.728.9832
m: 862. 324. 6544
a: 345 Hudson St. 16th Floor New York, NY 10014

APPENDIX G. EXECUTIVE SUMMARY

Background

Vaccine development in the last two hundred years has led to a positive impact in life expectancy in the 20th century. This aids in reduction of disease, illness, and mortality. Vaccination starts at birth, and the majority of vaccines are received during childhood. This is a cost-effective, preventative service. There has been an improvement in childhood vaccination rates in the U.S., yet vaccine rates are still inadequate. The recommendation for vaccination from a healthcare provider has been shown to play a vital part in parental decisions regarding vaccines for their children. Effective communication has positive effects on this.

Project Summary

Based on the need for enhanced awareness regarding childhood vaccines and communication with the parents, a continuing education module was developed and implemented in collaboration with the American Association of Nurse Practitioners Continuing Education Center. The module included information on factors contributing to the current childhood vaccination rates; barriers, communication styles, healthcare provider interventions that affect childhood vaccinations; and effective communication styles for healthcare providers. The co-investigator found that the results enhanced confidence in provider practice when discussing childhood vaccinations with parents.

Accreditation was received by the AANP and the module was made available to online viewers on the NDDOH immunization website. The target population included providers, students, or nursing staff that have access to the NDDOH website that show interest in increasing their knowledge of communication regarding childhood vaccines and may be in need of continuing education (CE) hours.

Results

Pretest, posttest, and response questions were used to evaluate the effectiveness and understanding of the educational module. Data were collected over approximately a six-week period. A total of 16 participants completed the educational module, and required pretest, posttest, and evaluation questions, with the completion rate at 76%. Participants consisted mostly of females. Most participants were from the Family Medicine setting, were Nurse Practitioners, and had over 10 years experience in healthcare.

The participants of the educational module reported overall satisfaction with the continuing educational module. Participants were asked to rate the event in which the module met the stated objectives, 87.5% of the participants reported either agree or strongly agree. Approximately 93% of participants reported a high level of satisfaction with the degree in which the content was free from commercial bias and that the content provided a fair and balanced coverage of the topic. A majority of the participants (75%) stated that they will modify their current practice after viewing the educational module. Approximately 94% of the participants reported a high level of satisfaction with the degree in which they felt more comfortable as a result of the educational module when discussing childhood vaccines with their patients and their parents.

There were four learning objectives that correlated with questions from the pretest and posttest. Participants of the online module scored higher on the posttest in regards to all four objectives. An increase in correct responses demonstrated learning as a result of the module. Participants also had the opportunity to leave feedback related to the module, in regards to what they found most helpful. These comments included the following statements, “having examples of how to use guiding, presumptive, or motivational interviewing styles in communication with

patients", "great overview, I think seasoned providers would greatly benefit from this module", "good info overall, good case studies", "a different yet effective way to communicate and encourage vaccinations", and "good information as I am new to public health and vaccinations." The overall results of the online module demonstrated positive results and enhanced awareness of communication regarding vaccines.

Recommendations

The online educational module received positive results overall and showed learning among the participants. The co-investigator felt it would have been reasonable to better disseminate the educational module, or other educational modules that pertain to this population, to any/all providers that impact the pediatric population. The continuing educational module continued to be available on the North Dakota Department of Health Immunization website until May 31, 2018. Data were no longer collected for the purpose of this project, but this would have allowed healthcare providers to have the opportunity to complete the learning module and receive 1 hour of continuing education credits beyond just the confines of this practice improvement project. The co-investigator felt it would be beneficial to reach as many participants as possible to impact learning and awareness.

Due to vaccines being administered and discussed in a variety of healthcare settings, including but not limited to, family practice, public health, specialty practice, inpatient hospital, schools, pharmacies, acute care, and emergency services. In the future, it could be beneficial for all healthcare providers including nurses, nurse practitioners, physicians, physician assistants, and pharmacists to complete the continuing educational module. The North Dakota Department of Health allowed anyone to participate in continuing education activities. Awareness of the educational opportunity was likely low to other areas of practice outside of the state. For future

implementation, the module could be made available to other online hosting sites for broader access and availability.

The co-investigator recommends that further education for healthcare providers be created regarding effective communication and vaccines in order to help increase immunization rates among the pediatric population, based off the findings from the literature review and this project. Another recommendation would include that online educational modules, such as the focus of this project, be incorporated into each states' vaccine education for healthcare providers.

To aid in improvement of this project, the co-investigator recommends that the length of implementation would be extended to six months. This could improve sample size and statistics. Publicizing the educational module with the local hospitals, clinics, and communities could benefit this project as well.